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SCIENCE AND PHILOSOPHY.

BY PROF. I. L. KEPHART, A. M.

Science is knowledge systematized. Wisdom is knowledge practically applied—so applied as to use the best means to accomplish the best ends. The truly wise man is the man who always uses the knowledge he has so as to produce the most desirable results.

The greatest rascals in the world have knowledge, but lack wisdom. Hence, the difference between "a sharp man" and "a wise man."

Science has to do with facts. Its business is to ascertain facts. Wisdom utilizes facts, so as to evolve the best ends. It is the business of the moral scientist to ascertain and systematize the facts relating to man's moral being; and it is the business of the moral philosopher—the truly wise man—to recognize and so utilize those facts as to elevate the moral nature of the race and thereby fit it for a blissful immortality.

Moral science reveals the fact of man's moral degradation. Moral philosophy recognizes the fact and provides a remedy. Socrates was a moral scientist. The "Son of Man" was a moral philosopher. Socrates, more than any other of the renowned men of Greece, brought to light the fact of man's moral degradation. Jesus Christ recognized this fact and provided the remedy. A knowledge of the fact, governed by a correct code of moral ethics such as is set forth in the Sermon on the Mount, is the only all-sufficient remedy for the world's moral degradation. The remedies suggested by Socrates were utterly inadequate, and he knew it; hence his declaration:—"My dear Alcibiades, I cannot teach you how to secure your greatest good, for I do not know; but I am sure the Creator is benevolent, and being so, he will, in his own good time, send man a teacher to teach him how to live so as to secure his greatest good." That Teacher came in the person of God's only Son, and his teachings we have in the four Gospels; and their effect for good upon humanity is a most satisfactory guarantee that they embody the remedy for the moral ills of the race.

Let no one despise the work of the *true* scientist. The discoveries in physics have done much to benefit mankind; but even here, only in so far as the facts and forces of the physical world brought to light by scientific investigation are *wisely* utilized, do they become a blessing to the race. If they are only so used as to secure material wealth, and with it stimulate avarice and oppression, then they become a curse instead of a blessing. But, if such discoveries are controlled and directed by a broad philanthropy, if *true* wisdom, such as recognizes the fact that to really benefit any part we must benefit the whole, utilize those forces, then do they prove to be a great blessing to the world.

Science discovered the cotton-gin; but cupidity and avarice (not wisdom), grasped it as a means of securing wealth for a privileged class, and thus converted it into an engine with which to forge chains for the slave. Hence, it became a curse instead of a blessing—a curse which culminated in a terrible war in which was sunk all the wealth the gin had ever accumulated.

The moral science which discovers the wants and conditions of man's moral nature is a great blessing, especially when the moral philosophy is at hand to provide a remedy and utilize the knowledge for the removal of the evil. But, if the wisdom is lacking, the discovery may be a disaster instead of an advantage.

Epicurus discovered the depraved condition of the race; but alas, what a mistake he made in providing a remedy! By worshipping at the shrine of pleasure, he sought to restore the shattered powers of man's moral nature. But his prescription, instead of allaying the malady, only gave unbridled freedom to all the baser passions of the soul and involved helpless humanity in a deeper degradation.

Well did the sturdy old Stoic, Zeno, in uttering his warning, say to him:—"Men will take the evil of your system and leave the good. They will do more; they will pervert the very nature of the good and wake up the whole evil unmixed. Your garden will be crowded, but it will be disgraced; your name will be in every mouth, but every mouth will be unworthy of it; nation's will have you in honor, but ere it is so, they will be in ruins; our degenerate country will worship you and expire at your feet."

How terribly Zeno's prediction as to the demoralizing effects of Epicureanism has been verified, let the overthrow of the Grecian and Roman empires witness! Unbridled passion, fiery lust consumed both their moral and physical energy, and they fell an easy prey to the more hardy, because less licentious tribes of the north of Europe.

But Jesus Christ has not only brought to light the fact of man's moral degradation—he has wisely provided an efficient remedy. As said above, the code of his Gospel is the antidote for all human maladies. The Golden Rule is the remedy needed; self-denial and active devotion to right accomplish the work. A trial of eighteen hundred years establishes beyond dispute, the efficiency of this remedy and the infinite wisdom of its author.

MIRACLE AND NATURAL LAW.

BY THOMAS MUNNELL, A. M.

Did the performance of a miracle ever violate any law of Nature? Have we any evidence of it whatever beyond the assertion of those who oppose miracles? May not the word Nature embrace a great deal more in her realm than is contemplated by physical science; and are we sure that the spiritual universe is not as much a part of Nature as the solar system? As there are different strata in the crust of the earth, each governed by the influences of it respective periods, may there not be different grades and systems of natural law, some of which may be discoverable by man and some wholly beyond his reach? Nature must include every thing that has been created, every thing below the Creator, and the attempt

to fence it in by what little is revealed by the telescope, the crucible, and other scientific accessories, only tells how small a mere scientist, without faith in God, is. What an animalcule, imagining that his drop of water is all that ever was made and that any unusual deed performed in his little world must be a violation of the laws of Nature! When Jesus walked upon the water he only had to command some natural law from a higher altitude which for the time predominated over the law of gravitation as when you leap from the ground or toss a stone into the air. But this knowing class of philosophers assume such a *tete-a-tete* familiarity with all Nature as to have been privately informed that one natural force never was temporarily overcome by another and that He therefore never did walk upon the water nor perform any other miracle in his life.

They *know* that Christ did not feed five thousand people with five loaves and two small fishes "and that's an end on't." They readily admit that the polypus, the coral insect and other little creatures can multiply by self-division, by gemination and other methods to millions and billions of the original number through some hidden power of which science is totally ignorant, but they can see no way by which five loaves of bread by some other power, no more mysterious, might increase only one thousand fold. They can see no violation of law in the former and nothing but violation in the latter. Nature can work her myriad wonders before their eyes by all the hidden forces at her command; but the God of Nature! what right has He to do the same by any forces not known to us?

Is a miracle a super-*natural* event necessarily? No. If it be merely super-*human* all its purposes are attained. The chief design of miracles in all dispensations was to prove the Divine mission of the one who wrought them—to prove that he was sent of God—and the evidence is just as strong if the act be super-human, as if it were supernatural. An act may be super-human and yet be strictly natural as when Jesus commanded certain powers to his aid when he raised Lazarus from the dead that were both altogether natural and altogether above the ability of man. The conceit of some intelligent scientists, that physical science embraces the whole of Nature, and that there is no plane of things above the material, or that matter is the first and the last, the Alpha and the Omega of all things, has caused them to ignore the whole spiritual universe, and to forget that the spiritual is a part of Nature. What if Jesus when calming the storm on Galilee commanded into action some higher natural law of which we know, nor never can know anything; and what if these laws, belonging to a higher plane of God's creation, were put at the service even of Apostles and Prophets as evidences of their Divine appointment to speak for God, why should such miracles be called violations of law? And why should the feeding of five thousand with seven loaves be considered an act above and contrary to Nature when a natural law quite sufficient could be had by rising to the proper altitude to find it? And why should any miracle be performed by a super-natural power when a natural power can be had to serve the purpose of evidence just as well? If God created a spiritual universe at all, it is just as much a part of Nature as are the distant Nebulæ, and must not be left out of our minds when we speak of the laws of Nature.

Any act is miraculous if it requires a command of super-human power. It was a miracle for Elisha to make iron to swim in the shape of an axe, but it is no miracle to make fifty tons of iron to swim in the shape of the hull of a ship; and yet the making of the one to swim may be just as natural as the other, considered from a higher plane. We are far from saying that Omnipotence cannot suspend, overcome, change or even destroy any natural law as readily and as harmlessly as any machinist can stop his engine or change any of its parts; but we do say that the assumption we are combatting is wholly gratuitous and should never be relied on as an argument against the possibility of a miracle.

That all the miracles of Jesus were wrought by at least super-human power, is evident from the fact that no one has ever been able to duplicate any one of them by the discovery of any occult powers of Nature nor by any other means. Science has no acquaintance with the sphere from whence He drew His strength and only displays its own impertinence when it attempts to criticise His acts. True science will keep on its own plane and mind its own business, while science "falsely so-called" is too ignorant to acknowledge any existence or any law outside of the little enclosure it has fenced in for itself.

THE NEEDS OF MODERN SCIENCE.

BY REV. F. HAMLIN.

One has well said "The mind, in its widest range, is a creature, not a creator; it is cognitive, and not creative." It has an eye fitted to see; but if that eye will go beyond its office, and produce what is not to be seen, that which is thus conjured up will be a phantom, an illusion, deceiving the eye which created it. Thus it is that the abnormal employment of the useful, breeds injury or destruction. Though made for other purposes, the knife may draw human blood; the vitriol may beget blindness; the river may become "even the winding sheet of the dead;" and *the soul a storehouse of worthless superstitions.* Such is the position of the materialistic scientist to-day. Having apparently mistaken his mission, he has given himself not to the *discovery of truth,* but *to the invention of theories,* which, however false or real, when once originated he defends with a devotion worthy of a better cause.

The great need of modern science is two-fold. *First: she needs a greater regard for fact than for preconceived opinions and hypotheses, &c.* If one of the renowned inventors of the age (Mr. Edison), can be believed, there are in most of th scientific works to-day a mountain of theory, to a grain of fact. He says "*there are more frauds in science than anywhere else;*" and then caustically adds: "I would rather know nothing about a thing in science, nine times out of ten, than what the books would tell me." "They (the text-books) are *mostly misleading.*" "You will find uncertainty *if not imposition* in half of what they state as scientific truth." Such a charge made by a respectable citizen against a fellow man, would certainly undermine the confidence of the community in him. What then should be the candid judgment of men concerning the majority of the scientific statements of the present day? Nor is our confidence in the integrity of some scientists strengthened or increased by their persistent adherance to theories which have been utterly exploded. How can Helmholtz, Mayer, Tyndall, Huxley, and the followers of the studious and

erratic, yet lamented Darwin, be true to their convictions, if after reading "The Problem" they do not abandon their baseless and misleading theories? The deductions of science, and conjectures based on such deductions must be in strict harmony with demonstrable *facts*.

Another need of modern science is, not the ability (for that it already has), but the disposition to act upon correct principles in the investigation of various forms of truth. Scientists tell us that one of the first and essential preparations for exact scientific study is to *exclude absolutely the emotions*. If this be true, then there can be no scientific investigation of theological subjects, for man instinctively, and involuntarily wishes for and longs for God and peace.

The truth is, "the knowledge of the highest things, those which most deeply concern us" (says Sharp), "is not attained by mere intellect, but by the harmonious action of understanding, imagination, feeling, conscience and will." This holds true universally. Ralph Waldo Emerson's opinions and beliefs were both variable and groundless while they hung only on the pendulum of his *thought* This led him to consider the Lord's supper a remnant of ancient superstition, plunged him with Fichte into pantheism, and led him to say: "Consistency is the hobgoblin of little minds." But in his later days, ere he gazed admiringly for the last time upon the roses and holyhocks in his own beautiful garden, the "Concord Plato" permitted all the forces of his unique nature to unite in harmonious action, and the result appears in his language to Mr. Alcott. "If you wish to call me a Christian theist, you have my authority to do so, and you must not leave out the word *Christian*, for to leave out that is to leave out everything." Thus it is that man cannot attain to a satisfactory knowledge of God by pure intellectual effort in the field of theology, and the same holds true in philosophy and science. Nor does scientific ability qualify one for the investigation of moral truths. A knowledge of the habits of flowers and animals or of the effects or uses of electricity does not make man an exceptional authority on questions about God and eternity. Evidently a person may be a thorough linguist, and yet know nothing about medicine. Distinction, as a chemist or geologist, no more prepares one to judge intelligently in the realm of morals, than does ability as a minister of the Gospel necessarily make one authority in botany or biology! Indeed in the nature of things, we cannot expect to find a plenary revelation of God in the natural world. When we wish to ascertain the abilities, powers, and dispositions of man, we consult not merely the work of his head and hands, for skill is *not character*. Do we learn the moral character of the architect by examining his plans; or of the artist by studying the delicate tints of his picture? The marble just from the hand of Thorwaldsen or Power is not a reflection, or revelation of their moral tendencies. So the "world by wisdom knows not God." To know Him, we must yield to instinctive proclivities; study Him not alone in the realm of creation, but (as conscience bids us view Him) in His relations to and in His dealings with moral intelligences, where law is not (as in Nature) uniformly obeyed, but where we are free to obey or disobey. We see this truth clearly illustrated in the fact that while a consideration of the multitude and grandeur of worlds, suns, and astral systems, which glitter in the vast empyrean, once *through abstract philosophy*, beget a stagnant pool of erroneous theory, whose noxious poison chilled and fevered the human mind with infidelity; Chalmers (thinking broadly, and making God's relation to man a factor in his argument), drained the marshy land, and brought forth from it fragrant flowers, and delicious fruits; and by the power of sound reasoning, restored the doubting to a firmer belief in the philosophical possibility and probability of the incarnation of Christ for, and his special interest in, the "inhabitants of this little world." We say, then, let science draw her conclusions from *truthful* premises, having their bases in fact, rather than in hypothesis; let her study *the moral character* of God, in the light of His dealings with moral intelligences; let her accept truth whether *beaming* from God's works, or *flashing* from His word; let her place beside God's thoughts of creation, his meditations concerning the created; beside the stellar worlds for examination and admiration the "Star of Bethlehem;" beside the closed grave (before which science stands in anxious, imploring silence) the resurrected Saviour with breath fragrant as the Easter lily; beside man, conscience stricken the "Advocate with the Father;" and beside the grief-smitten widow and orphan, Hope's Angel ever sweetly singing: "I will come again, and receive you unto myself." In short, let science the *child* (for of what other mother has ever one distinguished scientist been born) sieze again in warm affection the hand of Christianity *her mother;* then ere long amid the musical vibrations of Celestial Wires, the Holy Ghost will melt down philosophy and faith into one blaze of vision.

THE DOCTRINE OF FORM.

BY REV. STEPHEN WOOD.

In the study of forms, we need to keep in view this great truth: that all the forces of Nature are but the varied manifestations of the direct and constant influx into Nature, immediately from the Creator and mediately through all the intermediates; and, that the laws of Nature are the necessary relations existing between the effect produced and the immediate cause that produced it; and that it is the existence of these very laws, in a descending series, (the Divine influx,) that connects the Creator with the created. It is this direct influx from a higher source, and in its origin from the Divine, that gives the definite *form* to each specific thing in Nature. And right here we need a common understanding of the meaning of this word as used in these articles. Webster says: "Form is the particular disposition of matter, giving it individuality or distinctive character."

Shape is not form, but the true or natural shape of anything is the result of its form. "The form of anything is the disposition, determination and activity of its parts." The termination of form gives the natural shape to the subject formed. Each crystal is formed by its own laws and its true shape is the termination of form. The form of anything in Nature is what gives to that thing its real properties and qualities; or, it is that which distinguishes it from every other thing in Nature. The form of anything is the manifestation of the law of its being. "When a spiritual cause clothes itself with matter and thus becomes an effect, the effect, impelled by its cause, takes a definite structure, and that interior structure is its form."

"All created things are forms receiving influx from a higher source, and the innumerable phases of quality, life and character, in the recipient subjects, are always in exact agreement with their forms."

In discussing the Doctrine of Form, it is not necessary to suppose that there are different elements in Nature, which are real primordial entities; it is just as intelligible to conclude that, in the Divine efflux into the spiritual and thence into the natural, the one substance still remains one, as such, and that all the various forms of matter, as we now see them, have been made such by the different and particular arrangement of the ultimate "atoms," (whatever they may be,) in forming the molecules of each particular thing. Josiah P. Cooke, says: "I must confess that I am drawn to that view of Nature, which has favor with many of the most eminent physicists of the present time, and which sees in the cosmos, besides mind, only two essentially distinct beings, namely matter and energy; which regards all matter as one and all energy as one; and which refers the qualities of substances to the affection of one substratum, modified by the varying play of forces. * * * * No one who has followed modern physical discussion can doubt that the tendency of physical thought is to refer the differences of substances to a dynamical cause." (The New Chemistry Edition of '77.)

If we consider all energy as one and all substance as one, we may conclude that the particular action of energy, under the reaction of the surrounding conditions, may so *affect* the corpuscles that they will arrange themselves in such a manner, in uniting to form the molecules, as shall manifest that particular *affection;* and since it is demonstrated that this does take place in some cases, as in the different forms of carbon, phosphorus, sulphur and other "elementary bodies," it may be supposed that it is universal.

We need not conclude that physicists, in any earthly crucible, will ever be able to reduce all substances to this re-primordial element: and should they be able to do so, it might escape them altogether. It is now known that many of these supposed elements, under such changed conditions, in relation to active force, as shall cause their molecules to be entirely broken up, are changed to other forms, manifesting totally different and even opposite qualities. Liebig, says: "In chemical combination, the ultimate atoms of bodies are arranged side by side, in a certain order, and the properties of the compound depend entirely upon this order: if they are made to change their place (their mode of arrangement,) by an impulse from without, they may combine again in a different manner, and another compound be formed with totally different properties."

This influx into Nature from the Divine flows into all things in the created universe both mediately and immediately; and without both kinds of influx not anything could exist. The soul of every specific being, in the three kingdoms of Nature, is given by immediate influx tempered to that being. It is this immediate influx that arranges the form and gives to the subject internal structure and causes it to *sub*sist; but its *ex*istence is from the mediate influx, by which each thing depends upon that which is prior in Nature. We see something of the results of these two modes, in mineral, vegetable and animal existences; all vegetables alike receive their existence from the earth (which is the common mother,) by forces passing through all the intermediates, of the sun, atmospheres, and the earth; but their specific forms, which give them subsistence or real being were not from the common mother, or through the material media, but were arranged by spiritual forces flowing in immediately.

Different kinds of animals eat the same kinds of food, which maintains their existence; but this does not explain the fact that one is covered with hair, another with wool, and another with bristles; nor for any other specific difference. These distinctions depend upon their internal structure. Immediate influx is the *active* force, while mediate influx is the *passive* force by which anything exists.

Unless there be action and re-action there can be no progression. We use the word atoms, as a convenient term, bu do not wish to be understood that such entities without parts exist in Nature; on the contrary we assume that not the least thing exists in the natural world, that was not *formed* by spiritual forces terminating; and the form assumed must have its determinations, which terminate in time and space; for this entity must have been *caused*, and, because it exists it must have extention and other properties that may be varied.

SOLAR LIGHT AND HEAT.

BY PROF. H. M. JACKSON.

To the Editor of the Literary Microcosm:

DEAR SIR: In connection with your editorial on the danger of Comets I beg leave to make a suggestion respecting Solar light and heat.

I read with great pleasure your demonstration of the harmlessness of these impinging Comets and with like pleasure a very clear and temperate article in the Herald, by Prof. Parkhurst, on the same subject.

In your editorial you refer to Procter's assumption that the sudden blazing of the Star in the Northern Crown was due to Cometic Collision; this assumption you show to be gratuitous, and advance an explanation much more sensible. If you permit me, I have yet another to suggest.

It is well known that many of the stars undergo accessions of brilliancy: some of them having regular periods of waxing and waning. This phenomenon has sadly perplexed astronomers, and I have read many explanations; but I have never seen anywhere this I am about to advance.

Let us consider our own sun as an illustration. Prof. Parkhurst, in his article in the Herald, above referred to, shows how little we are likely to suffer from augmentation of the heat of the sun, by exhibiting how little of this heat would reach the earth. His words are: "In the first place that heat would be radiated into space in all directions, and not merely towards the earth. We should receive only that proportion of it which our earth would intercept." This statement proceeds upon the assumption that the sun's light and heat are radiated equally in *all* directions. It is precisely this assumption that I question. It appears to me as if this were a vast waste of solar energy. This energy is needed by *this* system principally, and it seems to me *a priori* probable that there will be some arrangement whereby the light and heat of the sun may be concentrated, to a large degree, in the zone of planetary revolution. Why then should it be thought incredible that the body of the sun may be surrounded by a refracting

medium, which the sun's revolution arranges in the form of a virtual *Meniscus* lens, thus concentrating its rays in the plane of its revolution which is also the plane of the planets? If this were true there would be a broad zone of light and heat proceeding from the sun in a direction perpendicular to its axis of revolution. Now then I submit these following as at least probable statements:

1st—That the sun is surrounded by a refracting medium.

2d—That if such medium exists it is certain that it will be flattened at the poles of the sun, and extended at the equator.

3d—That this refracting medium will then become a true lens, gathering and concentrating the light and heat of the sun in the zone of the planet's revolution.

4th—That in such case the temperature of the various planets may be more nearly equalized than we think, or than would be the case if they depended upon radiation alone for heat.

5th—That the principle of economy in Nature renders this theory plausible.

Now since we move altogether in this supposed zone, there is no way, that I can conceive of, by which we can verify this hypothesis from observations upon our own sun. But it will follow that if our sun is thus provided with a surrounding refracting medium, which is thus disposed, all other suns will in all probability be similarly provided and will be similarly the centres of zones of maximum light. It will also be probable that we will occasionally fall into and pass through these zones proceeding from other suns; in which case those distant suns will become for the time more brilliant, waxing and waning during the period of time required to pass through their zones.

This period I need not say will be longer or shorter as the angle of passage is acute or obtuse. Hence the fact that there are such stars, having periods of brilliancy, seems to me to be strong confirmatory evidence of the hypothesis I have just advanced.

I make this suggestion, Mr. Editor, with hesitation and diffidence. My own ignorance may have betrayed me into a palpable absurdity; and yet, this seems to be entirely reasonable and uncontradicted by any facts with which I am acquainted. It affords a rational and probable explanation of the variable stars. It suggests that Mercury may not be so uncomfortably hot, or Uranus so frigidly cold, as we think. It intimates that our sun may not be so prodigal with its energy as the accepted theory necessitates.

If all that I have said be true, I trust no one else has said the same, and I be found but uttering what is already well known.

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REMARKS.

There are two objections to the view given by Prof. Jackson. One is the fact that in the various observations taken of the sun during total eclipse no flattening or diminution of the photosphere or chromosphere has ever been reported as occurring at the solar poles. If the sun possessed a lens-like atmosphere to concentrate its rays in the general plane of the planetary orbits the sun's equator would be enormously extended and augmented in brilliancy, which could not fail to show in solar eclipses. The fact that it does not show perceptibly would seem to be against this lens theory.

The second objection to this view, and that which would seem to be fatal to it, is the vast distance of the fixed stars from our system, and the consequent absence of any appreciable paralax, even after many years of observation from the extremes of the earth's orbit of nearly 200,000,000 miles of base line for measurement. Such a necessarily slow change of our position to those distant suns would preclude the possibility of any sudden burst and subsidence of brilliancy from the cause supposed, which would require the earth to pass around the pole of a fixed star in a few days, when hundreds of years have not been sufficient for an appreciable paralax, or sufficient to appreciably separate the most near and remote fixed stars from the apparent position they occupied hundreds of years ago.

THE EDIFICE WE OCCUPY.

BY REV. T. WILLISTON.

Must not the edifice we occupy have had an allwise framer and architect? If in exploring some uninhabited island we were to find an empty house, we would at once conclude that the house owed its construction, not to some unusually knowing brutes, but to some man or men that had once tenanted the island. Even if the house was but a mere hovel, we would feel sure that a man must have planned and constructed it; how much more, if it was an admirably contrived and palatial structure, bearing marks in every part of its founder's achitectural foresight, wisdom and skill, and of his excellent taste. The grander or the more elegant and elaborate the structure, the more enthusiastic would be our eulogies of him that planned and erected it. What, then, are we to think of those that can, with "brute, unconscious gaze," and with irreverent, unadmiring hearts survey the magnificent edifice of which we are the tenants? That can look into Nature's vast mirror and see no face reflected there save their own? That can for years be conversant with things visible, without once catching even a glimpse of "Him who is invisible?" We mortals occupy one little corner of an edifice in which there are marks of a power, and forethought, and wisdom and skill, such as no man-reared house ever exhibits, and that as far surpasses man's capabilities as the infinite surpasses the finite. Of this power, this foresight, this unequalled wisdom and skill, let me, in two brief articles, present a few of the more obvious examples.

What proofs have we that the builder of the edifice we occupy has *unlimited power?* Come with me, reader, and let us take our stand outside of yonder doomed city, just as it is being rocked by an *earthquake*, or overwhelmed by a fiery torrent from yonder *volcano*. Or at a safe distance let us watch this cyclone, this awful *tornado* as it sweeps terrifically onward, uprooting and hurling aloft gigantic trees, and rendering whole villages a mass of crumbling ruins. Or go with me to old ocean's side when it is lashed into fury by a tempest, when the stoutest hearts quake, and whole navies are engulfed. Reader, see you no Omnipotent One in scenes like these?

And when heaven's artillery is unmuzzled, when lightnings flash, and thunders roar, and tempests bellow, is all this to you simply a war of elements? Is it not more than one of Nature's convulsive throes? A still more impressive exhibition of the great Builder's power we have in the fact that our globe, weighing several thousand billions of tons, is whirled around the sun, with us on it, at the rate of nearly 19 miles every second. Think of a car of such immense weight, and having on board some 1450 millions of passengers, being whirled along the sidereal railway about 68 thousand miles every hour, yet so noiselessly and imperceptibly that, if science did not reveal the fact, we would not know that we had budged an inch! Has any but an Infinite Being such power as this? Why, a boy that could, after tossing up three or four marbles, keep them for a moment or two from falling, or from hitting each other, would be deemed a great prodigy. What then shall we think of Him who, by a creative fiat, ushered a vast number of huge globes into being, and then flung them abroad throughout space, not to have a fortuitous or independent career, but to move noiselessly on, age after age, in the paths He had prescribed? Though some of these immensely heavy bodies move with an immense velocity, they each know and keep their own appointed track, and there is never any jar, or any collision. With such ease, through laws of His own creating, does He who flung them abroad control their movements, that they might with no irreverence be styled the playthings of the Almighty!

Let us next inquire whether *forethought* and *wise design* are as conspicuously displayed in the great tenement we are in, as is the attribute of power. While volumes might be written in proof and illustration of design in the book of Nature, and of adaptation of means to a wise end, a few of the more obvious examples shall suffice. And I shall derive my illustrations, not from things recondite or little known, but from facts open to the observation of all. * * * * * * * * * Had not the world's Builder been eminently provident and wise, He might not have had the Earth *revolve on its axis*, or had that axis *lean* 23½ *degrees toward the plane of the ecliptic*, or had *the atmosphere share in the Earth's diurnal rotation;* and the omission of any one of these three things would seemingly have been a capital oversight, and one attended with disastrous results. If, in moving round the sun, the Earth did not also rotate, the dwellers on any one meridian would have, alternately, a day and a night of six months each; and this would evidently prove a serious evil. Who would willingly exchange our present alternation of days and nights for one in which his day should last half a year, and his night another half? How parched and almost untenantable would a place become, on which for half a year the sun should continuously shine; and how cheerless, cold and sterile would be the same place during a six months' absence of the sun! One inconvenience of having six months of continuous sunshine would be, that the occupants of any one place would have no uniformity as to their sleeping hours. The blacksmith and the cooper, for instance might be wakeful and at work, at the very time when their near neighbors needed repose, and the sleep of the latter would in that case be disturbed by the clink of the smith's hammer, or the *rub-a-dub* of the cooper on his barrels! How fortunate are we that Chance was not the world's builder; that as things are now arranged, the earth and the air are every day alternately illumined and darkened, warmed and cooled; that thus often man is roused to exertion, and invited to seek repose; and that by the sun's withdrawal the dwellers on any one meridian are disposed to woo sleep at about the same hour. Important consequences, we see, were hinged on the question whether the Earth should rotate, as well as go round the sun; as also on the question *how rapidly* it should turn on itself. A much slower rotation than what it has would have been attended with many discomforts, while a far more rapid one would have proved destructive. Were our globe made to complete a rotation in about 84 minutes, all loose things on its surface would be thrown off, and the very globe itself would be in danger of crumbling to pieces. Chance might have given us either too slow or too swift a rotation, or no rotation at all, and in either case suffering and disaster would have resulted. Take a further look. Would any of us willingly exchange that charming variety of seasons we now have, or that variation there is in the length of our days and nights, or an arrangement in which there should be but one season, with equal days and nights throughout the year? If not, then let us admire the forethought which led the world's Planner to have the Earth's axis lean toward the plane of its orbit, instead of having it perpendicular to that plane. Had it not leaned at all, twelve hours would have been the unvarying measure of all our days and nights, and instead of four seasons we should have had but one. So if, in the formation of things, Chance or an ignoramus had presided, the atmosphere might not have been made to rotate in company with the Earth which it envelopes. What if it had not? Why, the citizens of Portsmouth, New Hampshire—or of any place lying 43 degrees North or South of the equator—would without intermission have to face a wind whose velocity was 765 miles an hour; while to those that dwell on or near the equator that tornado's speed would be at the rate of 1039 miles an hour! It is obvious that if the air or atmosphere did not turn with the Earth, the rotation of the latter would *whirl us against the air* with a velocity proportioned to our respective distances from the equator. We see, then, that if our globe and its atmospheric wrapper did not rotate together, no man, or tree, or edifice could for a moment stand before the awful wind storm that would rage without cessation.

(To be Concluded in our next No.)

MATTER AND MIND.

BY ELD. H. W. B. MYRICK.

There are two positions held by advanced thinkers upon this subject. The first is, mind is superior to matter; the second, matter is superior to mind. Those who adopt the last view regard matter as a cause and mind as the effect. In fact, as science has demonstrated, the indestructibility of matter, and the truth of the adage, *ex nihilo, nihil fit*, the devotee of the New Science goes farther and says that matter is not only a cause but *the* cause, the great First Cause. This is the assumption of dogmatic materialism, or naked Atheism. In the language of Ingersoll, "The earth, in connection with the influence of the sun, has produced whatever exists upon it." See the January number of the *Iconoclast*. A friend of mine, an Advent

preacher, said, when speaking of the origin of the Indians, "The soil produced them." That is legitimate materialism. It invests matter with all power life and energy.

There can be no doubt but that matter plays an important part in the wonders of the universe, but a little reflection will show that it is governed and controlled by a something superior to itself. My hand is matter, but it is controlled by my mind. So of all the organs of my body. Destroy them, one by one, and yet the mind remains—it is independent of these organs. But the materialist says, "Sir, if you destroy the brain you destroy the mind; hence, as the brain is matter, mind is a property of matter." But this is an assumption. It can never be proved. Here is the testimony of that somewhat noted Hebrew Infidel, Felix Adler: "The materialist fails to explain mind: *he does signally fail to do that.*" Lecture in Chickering Hall, New York, March 6, 1881. Such is the testimony of one of the leading materialists of the U. S. When a scholar of Prof. Adler's ability condemns this erratic, dirt-theology, in such strong terms, the small fry should hide their diminished heads. Talk of destroying the mind by destroying the brain! As well talk of destroying the power to talk by destroying the tongue. The tongue is only an instrument, and the destruction of the instrument does not destroy the power that employed it. See also Wilford's analogous argument in the Problem of Human Life, showing that the destruction of the armature did not destroy the magnetism. Farther, the facts (I mean *facts*) of modern Spiritualism, whatever else may be said of it, do emphatically demonstrate the existence of intelligent, disembodied spirits.

But about the brain. Is it the cause of thought, or are thoughts generated in the brain by the action of its molecules? So say the materialists, and here comes also the Rev. (?) Geo. C. Miln, and indicates the same thing. But I will put the Hebrew giant, Prof. Adler, against the Rev. gentleman, and say, as respects all others, that their *scientific* ideas of the brain as a thought generator is only equalled in assumption by that of supposing sound-waves in motion through a bar of iron or a poplar log. A man who thinks that a veritable wave can go meandering along in the iron bars of a railroad track, can, with a very little stretch of the imagination, believe that a hand-full of brains, in and of itself, measured the distances of the stars. But, they say, a man cannot think without a brain. Sure enough. He can't hear without ears, either, or see without eyes. Let us use a little common sense and class the brain with the ear and eye—organs used by the spirit. They are, one and all, instruments.

A great many speak of cause and effect, and they ring the changes on these two words as if with them they could unlock every secret of the universe. But there is one thing in the matter that is generally ignored, and that one thing cuts an astonishing figure as we shall see. The flippant use of the terms, cause and effect, would seem to indicate that a cause, a mere naked cause, can produce a given effect regardless of conditions. This is a grave mistake. There must be a medium through which, and upon which, the cause can operate. A cause can no more produce an effect without a medium, than a man can talk without a tongue. Let us have, cause, medium, and effect. When these three are given we may give an explanation of Nature. It is common to say, "There can be no effect without a cause." Very good, and yet you may have a vast amount of *cause*, and without appropriate media there will be no effect. Ingersoll says, "A cause acting upon nothing, if such a thing was possible, would produce nothing." Just so. A cause must *have something to act upon* in order to generate or produce something. To illustrate. A bar of hot iron will burn my naked arm when applied to it. Now heat is the cause, the bar of iron the medium of communication, and the burn is the result. But this heat would never burn my flesh unless brought in contact with it by the media. Now, can a thing be at once the cause and the effect? Obviously not, as in that case heat being the cause would also be the result. For the same reason a thing cannot be at once the cause and the medium, as that would make the heat the medium to conduct itself to my arm. Hence, as it appears, the cause, the effect, and the medium are distinct in their nature and cannot be identified as the same thing. Lastly, the medium can produce no effect without a cause. The bar of iron would never burn my arm in the absence of heat. Then, think if you can of a naked cause producing an effect without an adequate medium. It is impossible. A friend says, if a brick falls from a building and kills a man it disproves my idea, as the brick is the cause and death the effect. But it is a fallacy. The subtile force, gravity, which draws the brick downward, is the cause, and the brick is only a medium, the death of the man being the result or effect. So it may be shown with any illustration that can be produced.

Now, apply this to the brain and mind. If the brain is the cause and the mind the result, what is the medium? Merely to ask this significant question lets the bottom out of materialism. Here, between the brain and mind, is a vast hiatus, so deep and wide that no materialist can ever cross it. It will not do to say the brain itself is also the medium, for that would have the cause *acting upon itself* as the effect. As well say the heat, acting upon itself, could burn my arm without the iron bar! It is absurd. Clearly such a theory must be abandoned. Then will it do to say that the mind is the product of the brain? Not unless we admit the existence of another factor or element. As in the illustration of the falling brick we found an intangible substance, called gravity, so here we may expect to find something similar. And as the brick proved to be only a medium, instead of a cause, so shall we find as to the brain. What then is the cause? It is the self-conscious ego, the substantial, intangible spirit of man. With the brain as a medium it can manifest thought to the outer world. Here we have a *cause*. Atheism, assuming the brain as a cause, can never bridge the chasm, and connect, rationally, the cause with the effect. On the supposition of an intangible entity as the cause, all is made plain, and we are not forced to the humiliating conclusion of Prof. Adler. We may be as unable to grasp this mental entity as to comprehend magnetism, but admitting it to exist we are not hampered as the materialist is who calls it a function of matter.

One other thought in this paper. Thought, these materialistic theologians say, is the result of the play of brain-molecules. (These molecules playing, or interacting, is precisely the absurdity we pointed out of a cause acting upon itself, since the molecules can only act one upon another.) Now, granting that thought is generated by this molecular motion, the problem is still unsolved. I think, I reason. The ego is back of the motion

and hence as much a mystery as before. If thought results from this motion, *something* causes and directs the motion. I can, *at my pleasure*, think of this or that. Now, what is it that directs the play of the molecules so as *to produce given thoughts?* What is it that holds the molecules to their work, keeping them busily engaged so as to produce these thoughts *on a particular subject* and *for a definite time?* Here is intelligent action. Are the molecules intelligent? If so mind is not a result, or creation, of their play. Here are certain thoughts. I, the ego, am conscious of a desire to think on a certain subject. I do so. Now, if thought is the result of molecular play, I *induce that play at will* so as to think on any given subject. Here then the ego, a conscious entity, is back of the play of the brain-molecules, and directs their movements so as to induce thought on any particular subject. This view of the matter is manifestly unanswerable, and establishes the existence of an inner man, or entity, on such a firm foundation that I feel it to be invulnerable to the assaults of the atheist. Materialism not only fails to explain mind, but as a hypothesis it utterly breaks down.

I submit this to the readers of *The Microcosm* in the hope that it may lead some one better qualified to carry the thought still farther. One thing is certain, the arguments of the "*Problem of Human Life*" upon this pregnant theme remain still unanswered, and my feeble inspiration in the above is but the result of a careful study of that book.

GENTRYVILLE, MO.

ELECTRICITY; A NEW DEPARTURE.

BY PROF. W. H. H. MUSICK.

I profess to have made some discoveries in regard to electrical science, which I desire to give to the readers of the *Microcosm*. I cannot say but some of my ideas have been held by scientific men in past times, but I do not think that my theory, or one very nearly the same, has ever been distinctly and connectedly presented to the public.

In the first place, I will call electricity a fluid substance, whether material or immaterial I shall not here undertake to say. I know that this definition is old, and by many persons will be considered as exploded; but in scientific enquiry we often see explosions exploded. In the second place, I will hold to the old orthodox doctrine of positive and negative electricity, but from this point I shall have to depart from the doctrine of the text books, which speak of latent electricity, excited electricity, &c.

I shall not say but electricity may exist in Nature in a quiescent state, but I do not think that it has yet been discovered. I believe that the electricity with which we are acquainted is forever in motion, and that the various methods of exciting and generating it by friction or chemical action or rotation, if properly understood, would be resolved into so many modes of conducting, collecting, and directing the electrical current, so as to make it manifest to our senses. I believe that this fluid exists throughout space in a state of motion which is directed in straight lines to and from the particular atom or mass of matter to which the corpuscle of electricity corresponds or belongs, the two probably forming one dual inseperable nature or entity. That the deviations from this uniform direction, by conduction or other ascertained causes, are to be considered as accidental and temporary. By a moment's reflection, it will be perceived, that according to the above hypothesis, the direction of the general current of electricity throughout the universe coincides with the direction of the force of gravitation, and I believe that the positive or downward current produces the force of gravity by its friction on each atom of matter through which it passes in its downward movement to its corresponding atom. I also believe that the outward or negative current is the vehicle which conveys the corpuscles of light and caloric from all luminous and warm bodies. The velocity of light, and that of electricity, has been calculated to be about the same.

According to this hypothesis, if a ponderous body were to be projected downward from any point in space within the attraction of the earth with a greater velocity than that of electricity, the falling body would be retarded in motion by the force of gravity instead of being accelerated. If I should be asked why the upward current does not neutralize the downward current, I would answer that this is a matter for future investigation. If God had so willed, he could have made the positive current to move in rays of cylindrical form through which the negative would pass without coming in contact with the atoms of matter through which it passes, and so it may be.

To account for the phenomena of lightning, I suppose that the moisture of the clouds, by reason of its conducting quality, collects and condenses the electricity as it approaches the earth and recedes from it, until the electric fluid becomes sensible in the form of lightning. How much more simple and sufficient is this explanation, than the various theories that have been put forth to explain the mystery, that a single dense cloud will discharge its bolts continually for several hours before an equilibrium is produced, while according to the usual theory of the subject, we would expect that one discharge would be sufficient. Magnetism is very closely allied to electricity, perhaps identically the same in a modified form. A magnet differs from a conductor of electricity in this; that the ordinary conductor attracts and transmits the electric fluid which occurs in its vicinity in large quantities or at great altitudes, while the magnet has the power to hold a current of magnetism (or more strictly speaking, two contrary currents,) circulating continuously through it. If a disk of metal be presented to the poles of a magnet it becomes a temporary magnet by induction, the magnetic currents flowing through it in the same direction as those of the permanent magnet, and if the disks be suddenly reversed the induced currents of the disk antagonize the currents of the magnet, or to be more explicit, the positive current of the disk meets the positive current of the magnet, and the same with the negative currents; and the consequence is just what we should expect, viz: the disengagement of electricity. A great deal of thought and writing in regard to the separate and perfect polarity of the divided fragments of a magnet might have been saved if it had been understood that the force of a magnet proceeds from opposite currents always circulating round or through the magnets; and that consequently, polarity is a fact, not of position, but one of direction.

MAN A MICROCOSM.

REV. E. H. VAUGHAN, B. D., PH. D.

Man is said to be a Microcosm and so he is a world within himself. Unity in his being and yet mysterious in his complexity.

There is a difference between his physical and spiritual being, and also a difference between his soul and his spirit. There are, then, three steps in the ascending gradation of man's existence, and they consist of body, soul, and spirit; the lowest of which is the body, the basis of whose construction is dust, and which, in itself is only an arrangement of thoughtless, passive organs, mysteriously constructed, and the most wonderful of all chemical compounds, yet useful only as the servant of higher powers.

The body is said to be a metropolitan municipality of bones and muscles; an organized humanity, of which the head is the capitol and the abode of royalty. Within are the spacious halls of memory, reason and consciousness, where these invisible ruling elements in human naure constantly sit in judicial conclave, while the imperial majesty of the human will is enthroned in their midst and sceptered in sovereignty. This royal edifice is interpenetrated from the outside world by winding labyrinths and complicated corridors, along whose nervous centers fleet messengers hasten to and fro, conveying tidings for the Imperial Court, whose laws, edicts and mandates go forth for the government of humanity's realm.

But man partakes of the nature both of God and dust, and since God is more excellent than dust the governing part of man's nature must be farthest removed from dust and nearest to God.

The soul, being in nature nearer to God, must govern the body, and the spirit nearer still to His likeness, must govern the soul, for it is a law both of animal and spirit life, that the lower must be governed and ruled over by the higher.

If the mind, or soul, establishes its dominion over man, it becomes his governing power and arrogates to itself the position that it is the highest part of his nature, and in so doing confounds morality, which rules in the soul, with religion, which pertains to the spirit, and is not couched in the enticing words of man's wisdom, but is revealed only to the spirits of them that love God.

But, when the spirit rules over man it becomes the governing power of which God is the centre, and he then receives the mysterious wisdom of God revealed through the Spirit.

Man is the power through whom God governs the world, and when the elements in Nature bow in submission before his conquering power, they are only paying obeisance to that God who rules within, and acknowledging him as their rightful Lord and potent Ruler.

Man is then the embodiment of the whole Universe, in miniature, for whatever is involved in the constitution and real nature of spirit, and whatever be the phenomena of the spirit world, all have united in man's spirit, and thus constitute him the miniature embodiment of all spiritual being.

The natural and the spiritual worlds are both represented in his constitution so that he stands forth as the most wonderful and mysterious compound in universal being, the only being in whom is solved the mystery of the union between matter and spirit, and the only being where such complexity is recognized by our consciousness.

Combining these elements in his nature, man forms the connecting link between the material and the spiritual in the unity of God's system.

He is the highest in the material, and the lowest in the spirit realm. He is the isthmus lying between and connecting two worlds, for his body partakes of the material below and his spirit partakes of the spiritual above him.

It is he who links earth to heaven, heaven to earth and then to God as their primel cause, sovereign, head, and royal center.

OTHER VAGARIES OF SCIENCE

BY BARTON S. TAYLOR, M. D.

I am of the opinion that in no age of the world was there more written and published and called science, which is really nonsense, than in the present age. It is therefore with much satisfaction that I have seen the successful showing up of many of these vagaries in the *Problem of Human Life*, and in *The Microcosm*. They are to be found in all departments of science. There are some which the editor has not yet exposed. I would call attention to a few of these.

In Recent Advances in Physical Science, by Prof. P. G. Tait, in the compass of four pages, we find the following contradictions and absurdities. We will first notice his definition of energy, which is not particularly objectionable. On page 18, he says: "Energy may be defined as the power of work." Then energy is power. Power is not an entity; it is an attribute, or property. Power cannot exist in space apart from substance. It is a power of something; something possesses the power. If energy is power, it is a property.

Page 17, "Energy, though not matter, has as much claim to recognition on account of its objective existence as any portion of matter." Page 19, "We contemplate, therefore, with reference to energy, its conservation, which merely asserts its objective reality." Energy then, is a property of something, and yet it has objective reality, as much as matter has. To say that any thing is an objective reality in the same sense that matter is, "as much as matter," and yet that it is a property, is to assert a contradiction, and therefore an absurdity. There may be objective properties. Properties may have objective existence, but not "as much as matter." Either the definition is false or else the statement of its objectivity is false. The definition is no doubt true, as far as it goes. Then who would think of trying to prove that a property—solidity, fluidity, whiteness, elasticity, or any other property—must always exist in unchangeable quantity upon the earth? Properties may be more or less, may begin to be, and cease to be; as matter is changed in form, when ice becomes water, its solidity has ceased to be. When water becomes ice, its fluidity has ceased to be.

Page 16, "In every case in which force is said to act, what is really observed is either a transference, or a tendency to transference, of what is called energy from one portion of matter to another."

Energy is a property. A property is transferred from one substance to another, is it? What is it during its transit? A property cannot exist apart from its substance. If a property lets go of its substance, it has no more existence in time or space. Man has never in the name of science uttered a greater absurdity than this talk about

the transference of a property from one substance to another.

Page 25. "Change is necessary to the existence of phenomena, and that this change may take place, it is necessary that there should be constant transformations of energy." "The energy of the universe is constantly passing from higher to lower forms." "The low form to which all transformations with which we are at present acquainted seem inevitably to tend, is that of uniformly diffused heat." "When all the energy of the universe has taken the final form of uniformly diffused heat, it will obviously be impossible to make any use of this heat for further transformations,"—that is, all phenomena, work, change will cease. "Thus so far as we can determine, in the far distant future of the universe, the quantities of matter and energy will remain absolutely as they now are—the matter unchanged alike in quantity and quality, the energy also unchanged in quantity, but entirely transformed in quality to the low form of uniformly diffused heat."

In reference to these quotations, I have first to say that talk about the transformations of a property is nonsense. What sense would there be in talking about transforming redness into blueness, brittleness into ductility, roundness into squareness, etc. ?

But the contradiction, decrease and no decrease, was the point for which I selected these quotations. "Energy is the power of work,"—that is, power to produce motion, change. The time is coming when no power to produce change will exist in connection with the matter of the universe; still there will then be the same quantity of power to produce change as exists now,—power—no power. We measure the quantity of energy by the amount of work it does. When the successive forms of energy become less and less capable of performing work, all the world, except these astute scientists, say that it has diminished in quantity. These philosophers say that the quantity remains the same, but it has sunk to a lower grade in quality. How do they know the quantity at any time, but from the amount of work it can do? Is it something they can weigh or measure by other means than by the work it does? When it becomes capable of doing less work, and finally of no work at all, why do they still assert the existence of the same invariable quantity? When these philosophers look upon that cold, dead, motionless universe, how do they know that there is any energy at all there? All competent scientists know that one form of energy can never be made to produce another form of energy equal in quantity to its own quantity. In all experiments each successive form is less than its predecessors,—at least, is incapable of doing as much work as its predecessors;—it can never be re-transformed back into the same quantity of its predecessors; if it is transformed back, there is obtained only a greatly diminished quantity. Common sense says, there is a decrease in quantity. The Scottish philosophers, admitting the facts as here stated, say that it is a "degradation in quality." It is assumed beforehand that this power to work must remain the same, and when they see a constantly decreasing power to work, and finally an entire absence of any power to work, they still assert that the power to work still exists in changeless quantity, but is degraded in quality. They mean by the words "degraded in quality," just what other people mean by the words decreased in quantity. Whenever you read in the writings upon energy of the Scottish philosophers the words, "degraded in quality," you may translate it into your own language, and read it decreased in quantity. Then we have the very intelligent proposition. There is a decrease in quantity yet there is no decrease in quantity.

WILFORD'S BOOK.

BY A. L. COLE, D. D.

I have just finished the first reading of *The Problem of Human Life*. I do not propose now to review it, for two reasons: I have not the ability, and if I had, it would require an extensive volume to do justice. But I do propose to say something about it. In the first place, it is the most remarkable book I have yet seen from the pen of an uninspired writer. The subjects with which it deals and its manner and depth of dealing, make it not only remarkable, but unique, if not *sui generis*. It comes nearer the "missing link" in science, than even the Orang-outang, stand as erect as he may and jabber as well; and I here predict for its author, that he will go down in history one of two things, either the pivot on which science shall have made a radical turn, or the motor that shall have compelled theorists to *prove* their statements.

That such a book should confront such an age with such an attack upon received opinions, and its author live and grow; are the most remarkable facts in the annals of science, at least since the days of Galileo, and are inexplicable unless it is understood that its positions in the main, are tacitly considered impregnable by the leading men of science.

There has been too much compromise on the one hand, too much willingness to accept it on the other. Wilford has challenged this weakness and stupidity, with an integrity of purpose truly sublime. Take the "wave-theory of sound" for example. Who has formed real scientific satisfaction in its contemplation? What college student has been made to understand and appreciate it? And yet its Professors seem to have been perfectly willing to allow the student to accept a compromise of thought because he had not the mental attainment necessary to dissipate the fogs that hung over "sound.waves"(?) It may have been my own mental stupidity that prevented my seeing the force of the "arguments" for "sound-waves," during those years of toil in college, but if so, perspicacity is still denied me when I look upon these "waves," and especially when an effort is made by a "learned treatise," to call my attention to the "analogy" between them and water-waves, which is said to be perfect. Wilford's manipulations of the "wave-theory of sound," is one of the finest pieces of philosophical work, I have yet seen. His destruction of the "analogy" between "sound-waves" (?) and water-waves, is utter. He has exposed the folly of the assumption, with a perspicuity so brilliantly transparent that scientific spectacles are no longer required. Wave-length, amplitude, sound-velocity equal; wave velocity, unequal; these are points that pierce the heart of this boasting "analogy" that has dared to simulate a true likeness. We have sailed upon "the ocean wave," with an amplitude of forty feet, but who has seen a stone wall swell and heave and roll even forty molecular lengths, under the stroke of Katydid's big toe?

Take another example of Wilford's fine work in his treatment of "evolution." His exposure

here of palpable contradictions and stultifications, is a grand service to science. These contradictions completely demolish their authors' theories. (See *The Problem*, pp. 463, 516, 520, and other collections.) Theory is a hard thing to manage. It is difficult to make it stick together and speak truth of itself, simply because it is as likely as not to be without a foundation. When there is a solid foundation. When there is a solid substruction to start from, the superstructure can rise readily without serious mistakes and blunders. From the fact that "evolution" has no real basis, its best exponents necessarily and constantly contradict themselves. They have no anchorage, and no "guiding star." They flounder "hither and yan," break logic, assume analogies, and then ask the thought of the age to be reconciled. Thus adrift, "having no hope, and without God in the world," they are apt to speak from what happens to impress them at the time. Hence the mass of contradictions brought together from their books, as noted above.

"The fool hath said in his *heart*—not in his head—No God!" It is a bright day for the world when strong men see God in it. We live in that day, and thank God that Wilford is living with us. May his life be long, his health vigorous and his heart sweetly submissive to the Divine will, that this book of his shall be but the beginning of a career in the science of that life that can never die because God cannot die.

DIXON, California.

ELECTRICITY THE MOTOR POWER OF THE SOLAR SYSTEM. No. 1.

BY B. T. KAVANAUGH, M. D., D. D.

Mr. Editor: With your consent I propose to furnish you a series of articles presenting an outline view of my theory of Electricity as the motor power of the Solar System. It has been a subject of investigation with me for more than forty-five years, and is now presented in your columns that its merits may be fairly tested by falling under the observation and criticism of yourself and your able correspondents, holding myself responsible for the positions assumed and doctrines advanced.

While residing in the State of Illinois in 1834, I met with a learned, original and independent thinker, Judge John Richardson, from whom I obtained the germ idea upon which my present theory in regard to this subject is based.

Little was known of Electricity till long after the Copernican System was perfected, and its authors passed away. Sir Isaac Newton, the parent of the Universal Gravitation theory, died in 1727 when Dr. Benjamin Franklin, the great discoverer of the Universality of the Electric Fluid in Nature, was about twenty-one years of age. In 1752 he made the grand experiment of the kite, drawing electricity from the clouds and thus demonstrating its universal prevalence.

From this discovery, eighty years were allowed to pass, before any advance step was taken to utilize and employ electric or magnetic agencies for the benefit of the world. At this time Prof. Morse introduced the telegraph and Judge Richardson conceived the idea that the Electric forces formed the motor power by which the celestial bodies were controlled in their motions.

To apply this force to produce the diurnal motion of the Earth, Richardson held that that part of the Earth's surface which is turned away from the Sun for twelve hours must pass from a positively electric condition to a negative state, and that, as it is a law for positively electric bodies to attract negatives, therefore, the Sun must attract the rising side of the Earth from six o'clock in the morning, until twelve o'clock noon. But by this time, the Earth's surface immediately under the Sun passes from the negative to the positive, and is therefore repelled, answering to the well-known law that positives repel each other. Thus by attracting one side and repelling the other, a rotary motion is maintained by which we have day and night, a constant agency being at work every moment, giving renewed impulse to the Earth's motion on its axis.

There are results growing out of this diurnal revolution, that hold an inseparable connection with it, which were overlooked by Richardson, and have not been satisfactorily accounted for by any other theory, modern or ancient, that has fallen under my notice. I allude to the magnetic character of the Earth, its polarity, and the interchange of ocean currents between the poles.

The revolution of the Earth upon its axis from west to east, passing its surface at the rate of one thousand miles an hour under the direct rays of the Sun, has the effect (conjointly with its native magnetism) to convert the whole Earth into a magnet. As a proof that it is so magnetized it takes to itself a polarity, under the law that all magnetized bodies are polarized. This polarity of necessity is at right angles with the current of Electricity which passes around the Earth.

This important feature of the magnetic character of the Earth, with its polarity, has never been noticed by the advocates of the Newtonian theory, for the reason they had no knowledge of the all-pervading presence and power of Electricity. This defect in their system is fatal to a correct exposition of the laws which control planetary bodies.

It is not to be understood that the Earth receives all the magnetism it possesses from the Sun, for it is endowed with a magnetism peculiar to itself, and of an opposite character to that of the Sun, called negative electricity, which permeates the whole body and gives it polarity. The electricity derived from the Sun, which is positive, never enters solid bodies but rests upon their surface only. Therefore the positive current from the Sun, strongly attracted by the negative of the Earth, rests upon the surface only. Here it controls its motion upon its axis and holds its polarity at right angles with its current, and otherwise its opposite character keeps it continually under the government of the Sun.

Thus, according to known laws of Electric action, we account for the revolution of the Earth upon its axis, its magnetism and its polarity, by *self-adjusting* forces which secure a uniform and unwavering course of action through all time. We repudiate the idea that the space beyond the atmosphere of the Earth is a vacuum, and that a celestial body simply by the *momentum* given at its creation continues to move because there is nothing to interrupt or impede its progress. The facts are, there are no vacuums in Nature, but universal space is occupied by light, heat and electricity, which are the real elements of force, and controlling power of all motion. Hence without the action here contended for, the Earth would cease to roll, and the great wheels of Nature would stand still until a force more potent than "*momentum*" came to the rescue.

EXTRACT FROM THE "TRIAL."*

Seventh Sitting.

PROF. BIOPLASM *Recalled.*

Cross-examination continued by Mr. Discerner-of-facts : Professor Bioplasm, you were good enough yesterday to admit the reality and the strength of the apostolic testimony to Christ's resurrection: but you spoke of the conclusions of modern science forming an invincible barrier to your reception of that testimony?—Yes.

To what branch of modern science do you refer as presenting this invincible barrier?—A variety of sciences, I think.

Not all sciences?—No, not all sciences.

The science of chemistry, for example?—No.

Mathematics?—No, not mathematics, unless we take it as astronomically applied. I refer particularly to anthropological and biological science.

In what way do those sciences present a barrier to the reception of the resurrection of Jesus Christ?—Well they teach us the gradual development of life by evolution during incalculable ages past, in such a way as to exclude the possibility of specific creation, or of such a miracle as the resurrection of Christ.

Are you sure of the theory of development by evolution?—As sure as we can be of anything we have not seen.

Should you call biology and anthropology demonstrated sciences?—As near as we can come at demonstration in such matters.

Near demonstration is not demonstration?—We cannot attain to absolute demonstration in the problems of a past development.

If there is an absence of absolute demonstration, is it not possible the theory of evolution may be a mistake?—Mistake is, of course, not impossible: but I think the theory is a fair induction from accumulated facts.

Are you aware that the originators of the theory are not agreed among themselves?—I am aware of some slight divergences.

Should you call a difference of opinion as to the beginning of life a slight divergence?—It depends upon how you view it. Men may substantially agree as to the cause of biological development and differ as to the start.

But is not the question of the start a vital question in its bearing upon the idea of a Starting Power?—Granted.

You are aware that Mr. Lescher Wind holds, as the only rational hypothesis, that God miraculously formed the first organisms, "the primeval parents of all other organisms," and breathed into them the vital spark which constituted them living creatures, and that God therefore was the start of life?—I am aware that that is his view.

Professor Hawk Ill, on the other hand, rejects the idea or necessity for a God, or any other intelligent power in the universe, and holds that the primitive or first form of life, from which all other animals, including man, have sprung, arose by "spontaneous generation out of inorganic matter?"—Yes, that is Professor Hawk Ill's idea, which, I may say, is an idea coming into general favor, as more scientific than Mr. Wind's idea.

Should you call the denial of God a slight divergence from the recognition of God?—Of course, if you put it in that way, the difference seems great.

Is not that the actual difference between Mr. Wind and Professor Hawk Ill?—I cannot deny it.

And yet Mr. Wind is the father of evolution, and Mr. Hawk Ill its popular expounder?—Yes, men will differ, as is proverbial.

If the two pillars of evolution are disagreed as to the initial principle of the system, do you not think it establishes a strong doubt as to the soundness of the system?—The circumstance is to be deplored. It doubtless carries with it, to most people, the sort of feeling you refer to.

Are you aware that the system has been roundly and thoroughly attacked in a work recently published,* which is attracting a great deal of attention in America?—I have heard something of such a work.

Do you know that, in that work, the arguments of the evolutionists are overhauled in detail in a very thorough manner?—I have not read the work.

Are you aware that, in the opinion of many competent persons, including a number of scientific professors, that work hopelessly overthrows the whole evolutionist theory?—I suppose some people think so.

You say you have not read it?—I have not.

I should advise you to read it?—Perhaps I will.

Let me submit to you some of the points the author raises and urges, I may say with a vigor and spice quite phenomenal. You are presumably *au fait* with the subject sufficiently to defend the theory of evolution from attack?—I know something about it of course.

I think you acknowledged to a leaning in favor of Professor Hawk Ill's version of evolution?—I am inclined to coincide with his views.

Very well; for the purpose of my cross-examination, we will take it that you make Professor Hawk Ill's theory your own?—I think I need not be afraid to do so.

Then you would be prepared to maintain that life commenced upon earth by spontaneous generation?—I say such a hypothesis certainly seems the most probable in the present state of our information.

The idea of spontaneous generation is not very old?—No; the idea itself is older than the formulated theory. It did not at first obtain adherents on account of the composite structure of the simplest organisms then known.

What has happened to remove that difficulty?—The discovery of tiny, nearly inorganic, creatures, which have been styled *monera*. They are the simplest of all known organisms, as well as the simplest of all imaginable organisms. They are mere lumps of pure albumen, without organs or heterogeneous parts. They are no larger than pins' heads, and inhabit the bottom of the ocean.

In what way has the discovery of the *monera* removed the difficulty lying in the way of spontaneous generation?—Because we here have a creature in which all trace of organization is wanting—a creature in which all the vital phenomena are performed by one and the same homogeneous formless matter. The organless simplicity of this creature makes it an easy matter to imagine its origin by spontaneous generation.

"Imagine!" you don't bring imagination into science surely?—I use "imagine" for the want of a better word.

But why should you imagine this creature originated by spontaneous generation?—Because only homogeneous organisms composed of one

*For a brief description of this remarkable book, see the June number of *Microcosm*, last Volume.

**The Problem of Human Life*, HALL & Co., 23 Park Row, New York.

single substance could arise by spontaneous generation.

There is a little scientific dogmatism there, is there not?—I think not. All scientific schools are agreed that creatures of heterogeneous parts could not originate by spontaneous generation.

But why do you say homogeneous organisms could so originate?—That is the hypothesis.

It is a hypothesis out of which I hope to take the bottom before my cross-examination is done?—If you can do so legitimately, I shall be the last to complain. I only desire truth.

Do not suppose I cast a reflection?—I do not suppose it for a moment.

Now let us see: how do you know this moneron is composed of a single substance?—Because, on chemical analysis, it yields only albumen.

Can you distinguish between albumen and fibrine in chemical analysis?—To some extent.

Can you distinguish positively between albumen and fibrine in chemical analysis?—I am not quite sure as to the extent to which that discrimination can be carried.

Are you not aware that eminent physiological authorities (Carpenter and Liebig for example), have laid it down that no chemical difference exists by which albumen and fibrine can be distinguished?—I have some memory to that effect.

Are you prepared to lay down a contrary doctrine, and to assert that there is a marked chemical distinction between the two substances?—I am not.

How can you be sure then that there is no fibrine in the constitution of the moneron?—I cannot, of course, be absolutely certain.

If not certain on that point, how can you be sure the moneron is a creature of a homogeneous or single substance?—We cannot, of course, be absolutely certain.

May there not be other substances besides fibrine in the constitution of the moneron?—I think not.

Does it not contain water?—Of course. In all living bodies, without exception, there is a certain quantity of water.

Is it not a fact that all animals and all plants, in fact all organisms consist in great measure of water, combined in a peculiar manner with other substances?—I cannot take exception to that proposition.

Very well, if water as a vital ingredient combines with various substances, since there is water in the living moneron, why are you so sure that there are not other substances besides albumen and possibly fibrine in its constitution!—They have not been discovered.

Are you prepared to say that they are not there?—I do not believe they are there.

May they not be there?—It does not become a scientific man to dogmatize.

You are not prepared to assert that they are not there?—I am not prepared to go further than I have gone.

Very well, then, they may be there, since water is there, and if there, what becomes of the theory that the moneron, being of a single substance, may have spontaneously generated?—That is a matter for argument.

Well, so much for that. Now, you say that the moneron is a creature without organs?—Yes; it is itself an organism, but not in any way built up of distinct organs. It consists solely of a single chemical combination.

You are quite sure it has no organs?—I think so.

Why?—Well, there the creature is; you can examine it under the microscope and no organs are visible.

Do you make the fact that no organs can be seen, a reason for the assumption that there are no organs?—It seems a reasonable assumption in the circumstances.

Are you aware that there are creatures with organs too small to be visible under the most powerful microscope?—I suppose there are.

And yet whose existence is recognized from the functions performed by the creature?—I suppose there are such cases.

The rotifer, for example, or wheel animalcule, whose head is finished off with a circle or crown of very small hairs, which bend in regular succession all round, with the effect of giving it the appearance of a revolving wheel?—I have heard of the rotifer.

Are you aware that that revolving wheel of hairs is only visible under a powerful microscope?—Yes; it cannot be seen with the naked eye.

Are you aware that while the hairs are visible, no muscular nor other organs are visible by which these hairs are bent?—I suppose that is the case.

As a scientific man, would you say that because no structural arrangement can be seen at the base of these minute hairs, by which their motion is produced, therefore there is no such arrangement?—I don't suppose I should. The fact of the movement of the hairs may be taken as proof of the existence of an apparatus capable of producing the motion.

Quite so: very well, you say the moneron has no organs, because they are not visible. Does it not perform motions involving the use of organs?—The moneron performs motions of course.

Does it move itself?—Yes.

In what way?—It forms on its upper surface, shapeless, finger-like processes, or very fine radiated threads, which we call pseudo-podia, or false feet.

Does it eat?—It absorbs nutrition.

Does it grow?—Yes, it grows from a smaller to a larger size.

Does it propagate?—It propagates, but it is by simple sub-division. At a certain stage of its growth, a pinching-in takes place, contracting the middle of the globule on all sides, and finally leads to the separation of the two halves. Each half then becomes rounded off, and appears as an independent individual which commences anew the simple course of vital phenomena of nutrition and propagation.

And do you mean gravely to maintain, Professor Bioplapsm, that all this is done without organs?—No organs are apparent.

Neither is there a rotatory apparatus apparent in the rotifer. Do you think when the moneron moves by thrusting out its finger-like processes, as you have termed them, that there are no muscles or analogous organs to cause the projection to take place?—Something must cause the projection to take place, of course.

Can you conceive of the moneron growing by nutrition, without organs to assimilate the nutriment to its own being?—I have never thought of it in that way.

Can you conceive of propagation by self-division taking place without an apparatus, invisible to us though it may be, leading organically to such a consummate structural feat as breaking up a living creature into two, without destroying either?—I confess I had not thought of it in that way.

Is it not inevitable that the moneron, perform-

ing all these organic operations, must possess organs, though we have no lenses powerful enough to make them visible?—It would seem a reasonable conclusion, I confess.

Now, if the moneron be possessed of organs, it is "a creature of heterogeneous parts," of course; and how then am I to understand your application of what you said was the universally accepted scientific postulate, that "no creature of heterogeneous parts could originate by spontaneous generation?"—There you place me in a difficulty.

Not wishing to press you too severely, let me pass to another point. You have said that scientists have been able to "imagine" the spontaneous generation of the moneron, on account of its simplicity of structure (though we have seen that that simplicity of structure is by no means so simple as they have assumed)?—I have said so. The discovery of the moneron has imparted to the hypothesis of spontaneous generation a degree of probability which it lacked previously.

Very well, simple or complex, have you ever known a case of a moneron being spontaneously generated?—No.

Is it not a fact that experiments have been conducted with a view to test this matter, and that living forms will not generate in liquids from which all germs have been excluded?—I believe that is the fact. In fact, it is generally conceded that spontaneous generation is not now possible.

Why not?—Because the general conditions of life upon earth under which spontaneous generation is assumed to have taken place, are so entirely altered. Spontaneous generation, which now is perhaps no longer possible, may have taken place at a time when enormous masses of carbon impregnated the atmosphere before they were condensed into coal in the primary coal mountains.

"May have!" You don't call that scientific, do you?—We are obliged to postulate possibilities in forming a hypothesis.

What can carbon have to do with it? Are you not aware that the theory requires that spontaneous generation should have taken place millions of years before the carboniferous period commenced?—My memory fails me a little on that point.

Does not Professor Hawk Ill date "the first and longest division of the organic history of the earth," "from the first spontaneous generation to the end of the Silurian system of deposits?" He adds: "During this immeasurable space of time, which in all probability was much longer than all the other four epochs taken together, the three most extensive of all the Neptunic systems of strata were deposited."—(*History of Creation*, vol. ii, p. 9.) Thus this immense period, at the beginning of which he assumes spontaneous generation to have taken place, ended millions of years before the carboniferous age began?—Yes; I had forgotten that point; but I know the same authority suggests the excessive presence of carbor in the air as a probable cause of spontaneous generation.

The excessive presence of carbon 50 millions of years before the carbon period began?—It would seem so.

Are you prepared to stand by that?—It is a little perplexing I admit. Still the conditions of life must have been different in these remote ages, and may have admitted of spontaneous generation which is impossible now.

Are you content to call that "demonstrated science," and to make a nebulous, hypothetical, and uncertain theory, a reason for rejecting the evidence of Christ's resurrection, which you admit cannot be set aside?—I think I did not exactly admit that.

Well, never mind; to return to the point, why do you assume that the conditions of life differed in these remote ages from those now prevailing upon the earth?—It is a reasonable assumption in view of the changes that have been in progress.

Are you not aware that there is evidence of the conditions of life having been exactly the same in these primeval times as they are at present?—I should like to know it.

Are you not aware that species of fishes and molluscs, which lived long before the carboniferous period, in the Devonian, and Silurian ages, not only continued to live all the way through the carboniferous period, but have continued to the present time without the slightest change in their organic structures?—Perhaps you can mention illustrations?

Yes; our still existing ganoids and numerous species of shell-fish?—I had overlooked the fact.

Do you doubt it?—I am not prepared to take positive ground.

Perhaps you will accept the evidence of Mr. Leschar Wind: "Some groups (of molluscs), as we have seen, have endured from the earliest known dawn of life to the present day. . . . In the genus lingula, for instance, the species which have successively appeared at all ages must have been connected by an unbroken series of generations from the lowest Silurian stratum to the present day?"—The authority is good.

Does it not amount to positive proof that the conditions of life, instead of being entirely different, have been exactly the same all the way down from the beginning of life upon earth, millions of years before the age of carbon began?—I am bound to admit the cogency of the argument.

The conditions have been the same all the time. I return to the question: why should spontaneous generation take place then and not now?—I simply cannot answer the question.

If we substitute special creation for spontaneous generation, the difficulty would vanish?—To a certain extent.

Altogether, wouldn't it?—Perhaps, in a certain direction, but it might lead to difficulties in other directions.

Now let me take you a stage further. Let us assume, for the sake of argument, that the moneron was spontaneously generated, how do you connect the existence of the moneron with the development of species?—Our theory is, that once life had a start, it would perfect itself in the forms of its manifestations by a process of development through use. A process of natural selection would take place by the laws of inheritance. It is a slow process, but it acts surely. It accumulates slight successive variations from generation to generation, according to the necessities imposed by environment; so that simple forms of life would in process of time grow more complex, and lead to the diversification of species.

That is the theory?—That is the theory.

Do you think it is a theory substantiated by the facts?—I think so.

By all the facts?—By some of them.

How long, according to the theory, would it take a moneron to advance to a higher form of life?—It is impossible to tell.

How long ago is it, since the original supposed spontaneous generation of monera took place?—We can only approximate roughly.

Can you approximate to a million or two of years?—It must be countless millions of years since monera first spontaneously generated.

Countless millions?—I should say so.

There can be no doubt of that, can there?—No doubt I think.

Very well, can you tell me whether there are any monera now?—Oh, yes.

Many?—I believe they are found in enormous numbers at the bottom of the ocean.

Is it not a fact that they are to day the most numerous of all living creatures?—It is probable they are.

And I believe, after all these millions upon millions of years, they are still "the simplest of all imaginable organisms?"—Yes.

The same "one single substance" they were at the beginning of the Laurentian period, long before the carboniferous or coal age began?—The same.

This simple moneron, which your theory regards as "the parent of all other organisms," continues as destitute of parts and organs, after existing countless millions of years, as when it was first ushered into being out of inorganic matter, as you assume?—That is the fact.

Well, now, Professor Bioplasm, how do you account for the present existence of the monera at all on your theory?—It has remained undifferentiated.

Ay, but the theory is that the improved descenddants of any organic species in their gradual development towards a higher grade of structure, must invariably supplant and exterminate the unimproved or parent form, in the struggle for existence. Is not that so?—That is the doctrine of evolution.

It is the doctrine of evolution we are trying?—Yes.

Is it not laid down as a principle by all evolutionists that it is only by the extermination of the unimproved individuals, through "survival of the fittest," that "natural selection" gradually advances to more perfect forms?—That I believe is the principle.

Evolutionists hold that "new and improved varieties will inevitably supplant and exterminate the older?—I believe they do.

Then I want you to explain why the monera, which you hold to be "the primeval parents of all other organisms," have not been exterminated?—I have never addressed myself to the consideration of that problem.

Is it not a difficulty in the way of the theory? It looks like it.

Can you explain, or suggest an explanation, or approximate to the suggestion of an explanation, in harmony with the theory of evolution, how it is that the very lowest organism,—the weakest, the most defenseless, the best adapted as the food of others, and consequently the most unfit for survival, should, instead of becoming "rarer and rarer, and finally extinct," as the theory requires, exist in countless millions, while the thousands of its supposed varieties, which were unavoidably necessary for transmutation to higher species, should all have succumbed without a specimen remaining to indicate such transitional gradations?—I should require to give the question some thought before I could venture upon an answer.

[To be Continued.]

☞The difficulties presented by Mr. *Discerner-of-facts*, in this beautiful cross-examination of *Prof. Bioplasm*, are taken almost *verbatim* from the *Problem of Human Life.*

EXPERIMENTS IN SOUND.

BY CAPT. R. KELSO CARTER, C. E.

It seems peculiarly fitting, after the distinguished success which has crowned the efforts of *The Microcosm* during the year just past, that we are able to present, under the above head, an argument against the wave-theory of sound, so conclusive; involving discrepancies and direct contradictions in that theory so appalling and absurd, that absurdity can go no farther. For many months the notes of the experiments have slumbered peacefully in a little book, but now they must come forward as a reserve, much stronger than all the forces hitherto sent to the front. Not to waste words, we will state the subject to be the influence of temperature upon *the vibrations of a sounding body* and also upon the velocity of sound itself. It is well known that Sir Isaac Newton made a calculation of the sound velocity in air, and deduced therefrom 916 ft. per second, or one-sixth less than the truth as proved by actual experiment. Laplace stepped into the breach with the fearfully ingenious theory of the heat resulting from the compression of the "condensed pulse," quickening the speed of the air-wave, and thus making up the difference between 916 and 1090 at freezing temperature. Of course anyone would naturally ask why the cold produced in the "rarefied pulse" does not exactly neutralize the heat of the other or compressed half of the wave; but such men as Tyndall managed to foresee that difficulty. His explanation is entirely too large to be inserted here, but if any one wishes to read an able attempt to explain what never existed, he is respectfully referred to Tyndall on sound, p. 29 to 37. Just here we do intend to put Prof. Tyndall on trial for a gross and transparent misstatement of the facts in the case.

On p. 31 he clearly describes the effect of the heat produced by the condensation, to be a stiffening of the spring-power between the air-particles, by which of course they would naturally resist pressure more and *tend to spread further apart*; while on page 32 he says, "the heat developed in the condensation augments the rapidity *of the condensation*," and then proceeds to affirm that *both the heat and the cold* help the limping sound-wave to catch up with the facts.

Now it is self-evident that heat can in no conceivable way help on or assist any form of matter to condense, and no man knows this better than Prof. Tyndall; yet he here has the assurance to assume that "velocity of propagation" on page 31 and the condensation or act of condensing on page 32 are one and the same thing. Pull out this little bolt and the hinge to his door is broken at once—and herein is the logical weakness of the elaborate argument.

But do not think that we are digressing; on the contrary we are right in the line, for we will now proceed to show that, if the wave-theory be true, it follows with overwhelming force that a tuning fork will vibrate *much faster* when heated a number of degrees, notwithstanding the fact that it is thereby made *longer* and hence should vibrate more slowly. The experiments were tried with three pairs of forks, but to save space and figuring we will consider only one, the C3 of Kœnig, 256 vibrations per second. We carefully tried two of these, in perfect unison, when at a temperature of zero centigrade and again at 130 degrees; and observed what length of tube resounded to each, as in previous experiments. Here are the results:

Forks	Tube length,
C3- - - -0. Cent.	13 in.
" - - -130. "	15.4 in.

The other forks were carefully tried and gave similar results. Now a little simple arithmetic will give a surprise. Multiplying the tube lengths by 4 to get the entire wave-length in each case, reducing inches to feet, and dividing into the velocity of sound at the recorded temperature, we get the number of vibrations made by the fork. Thus we have:

At 0 Cent. velocity of 1090 ft.–divide by 4⅓ ft.= 251 vibrations.

At 130 Cent. velocity of 1350 ft.–divide by 5.1 ft.= 264 vibrations.

The 1350 is obtained by adding to the 1090 zero velocity, 2ft. for each degree of heat, or 260, in all: according to Tyndall and all other authorities. We are here met by the astounding showing of 251 vibrations for a fork at zero, as opposed to 264 of the *same fork* when heated to 130 degrees, and thereby lengthed; when of course it should vibrate more slowly. Could absurdity go farther?

Let Prof. Mayer or anyone else ponder a little over these figures, experiment as they will, and see if they can be reduced, twisted or strained into any kind of conformity with sense and fact. It is certainly an ugly dilemma, but here it is. What shall be done with it? It is astonishing how any man of brains can seize upon so infinitesimal a matter as the supposed increment of heat in a condensed pulse to sustain his theory, and at the same time totally overlook objections immensely larger and more sensible. When Prof. Mayer on page 120 talks of 441 vibrations of a fork, he casually mentions that these are made in *about* 68° F.; but elsewhere he, like Tyndall, totally ignores the temperature when considering these vibrations; although both of them know well that the maker, when tuning these forks into unison, is compelled to set them away to cool, after a little work with a file, in order that the heat induced may not change the number of vibrations.

But there is another way of approaching this subject, and that not dependant upon any resonant tubes. On page 109 Prof. Mayer clearly explains what are called "beats." If one fork gives one more vibration in a second than another, and both are sounded together, we hear once in a second a little swell of sound followed by a loss of volume. This is a "beat," and by counting the number heard in ten or twenty seconds we can arrive at a very accurate result as to the difference in the number of vibrations given by two forks. This method we used. Sounding the two forks at the same temperature, perfect unison, smooth and clear, was the result; but on heating one slightly, "beats" became audible. One fork at zero Cent. and the other at 130 gave about three beats; not more, but possibly a little less. There can be no possible question that this method is infinitely more accurate that the previous calculation, but it gives us the startling difference of 3 against 13 vibrations.

Moreover the ear steps in here and unhesitatingly affirms that the fork heated to 130 gives a graver sound that the one at zero, and hence it vibrates more slowly, thus coinciding with the truth all round. That nothing should be left undone we made a hasty calculation based upon the coefficient of expansion of steel, taking it as .0000122 for one degree Centigrade and found from that method a probable difference between the two forks of *only one beat or vibration*

This was done by assuming the 256 to belong to the average temperature in which the forks were tuned, reducing to zero and expanding to 130, by means of the law that the number of vibrations is inversely as the square of the length. There is a slight difference here between the observed beats and the calculation from coefficient of expansion. We do not pretend to account for anything in the wave-theory, but simply state that the calculation was laborious owing to the large numbers involved, and we did not think it necessary to honor the grave of a dead humbug by firing very heavy ordnance over it, and hence performed the arithmetical work rather hastily. If anyone can discover a mistake that will aid the resurrection of the victim, he is welcome to try.

One great fact is certainly proved by these experiments. It is manifest that another *strange accident* has served Prof. Tyndall and others. The above facts show that while the velocity of sound changes very considerably with the temperature, the pitch of the sounding body does not alter materially. The strange accident consists in the fact that the ordinary temperature in which Prof. Tyndall tried his experiments just *happened* to allow a velocity of sound which coincided with the vibrations of the fork and the resonant tube of the diameter he *happened* to use.

Had Prof. Tyndall performed his experiment in an oven heated to 130 deg. Cent. he would have found a tube of 15.4 in. length necessary to resound to his C3 fork; and, knowing the velocity of sound in that temperature to be 1350 ft., he would have been startled by finding 264 vibrations instead of 256: but such things never occurred with him or in his experience. He just *happened* to have the right temperature about him; a tube of the right diameter *happened* to be standing on his table; this tube *happened* to have the flaring lip necessary for his desired length, and finally Prof. Tyndall *happened* to get a result that proved his pet theory to be true. What shall we say to such a succession of happy accidents? Verily they almost cease to be such, and fairly appear to give evidence of a design by a Superior Power; making it seem that he, who a few years ago "saw in matter the promise and potency of every form of life," has been led into a curious pitfall of his own digging, from the bottom of which he can begin anew to search for the light that is not to be found in matter, but in the revelations of the Great Mind, who alone holds the wonderful secrets of Nature.

PA. MIL. ACAD., July, 1882.

LAW, LIFE, MIND

BY J. H. HOFFER.

Perfect law is principle, and it is from life. The laws of Nature are therefore the governing principles, and the very life, of matter, and of all things that have permanent existence in Nature. Limiting however the laws of Nature to their operations in matter, life itself must claim a higher law, or its utter destruction must be admitted. For when life departs from the material plant or animal form, the recognized laws of Nature show no further evidence of its continued existence.

But, that life is at least as durable as matter, and what seems to be death must therefore be only its separation from matter, and thus from the physical senses, cannot be doubted; for absolute

annihilation is against all law, and is therefore impossible. And if life can exist independent of matter there must be an immaterial realm to which it belongs. The laws which govern life can therefore not be claimed as being confined to matter. Yet they are the same laws that govern matter, for when closely examined life and matter are seen to be governed alike, as it is plain they must be. Life uses matter as man uses a tool, and if both were not under the same law this could not be done.

Indeed, all government is of life; for there can be no action without life. A law that cannot be enforced is a dead law; hence all active laws must belong to the immaterial realm of life. But matter is also governed by active laws, and cannot exist without them; therefore also matter is subject to life.

A little consideration develops the fact that there could be no variations in life except by its connection with that which is dead. Light can only be modified by darkness, and heat by cold; and so all modifications of any thing come by things opposite thereto, or in some way differing therefrom. And, since life alone has action these changes result from the extension of life into deadness, or into things already modified by that which is dead.

But what is death? Death is not an entity or thing, it is simply the absence of life, or of that degree of life which is necessary to operate the thing that is said to be dead. All existence being from life there can be no existence without life, consequently no absolute death. It is evident that there can be no limit to the degrees or modifications of life from that which is Life itself—"The Life," down to a state of mere existence. In life, is the power of extension from its center, The Life, and Nature is its most remote sphere; and here the outer shell or crust is matter. Where matter stops any kind of action, is the death of that which is thus stopped, so far as its connection with matter is concerned.

Nothing seems more reasonable than, that life can, and indeed must, exist independent of dead matter, as well as in connection with it. In thought we have an example that approaches such an independent state. Time and space, which are conditions of matter, do not affect thought; nor do many other conditions of matter apply to it, as gravity, inertia, impenetrability, &c.

That all existence implies substance in form is self-evident; hence there can be no life without substance in form. This makes it plain that there are other substances besides the material. And that these other are living, or the substances of life, is evident; because life abides in them, which it does not in or with matter. And as these are not subject to what is called space in matter, they can occupy the same place that matter does; which they must do, since matter exists by them, even to the minutest particles.

The world of life, very properly called spirit, and the world of matter, are therefore not separate realms. Where matter is there must also be spirit, but there must be somewhere, or at least in some Being, Spirit too pure for matter, Life above death—pure Infinite Life, which cannot be touched or affected, and which can only act outward from itself. If there were no life thus independent of death there could be no permanency in anything.

Man who possesses the highest degree of life manifest in Nature, and who therefore has more control over matter than any other being in this world, is nevertheless inclined to regard matter as being the most real, or at least as that with which he is best acquainted. Why not study life first, which rises above mere existence and which alone can take cognizance of other things, and even of ourselves?

Nothing can be more unnatural than to suppose that dead matter can produce life. Can flesh, the particles of matter which compose the physical body of a man, and which may be used by any other form of life in building a material body for it—can this cause the heart to beat, the stomach to digest, the mind to think? Man, study yourself, and you shall know more of these things.

Life is the cause in Nature. In its organized form it takes matter and forms over itself a body, and with the matter thus held by it does it come in contact with the outside material world. The properties of matter are the life or spirit cropping out of it. Assuming matter to be the cause of all being is like accepting as real the appearance that the Sun is daily swung around the earth. It takes a great stretch of imagination in this way to account for the seasons and the apparent motion of the stars, for eclipses and so on; but a much greater stretch is required, when matter is regarded as the cause of all things, to account for the innumerable phenomena of life. But, having found out that the sun is fixed, all solar phenomena explain themselves; and so will all things in science or physics explain themselves when we study the nature of life and comprehend that it is the centre and cause of all existence.

Mind, which places man above all animals, is the highest evidence of life we can have any knowledge of. And the highest must be nearest the Infinite. From the mind extend the members of the body as its tools; but in its operation the mind is not limited to these, nor even to our world. Mind is comparatively unlimited in its operations. The universe is its field of operation, and neither past nor future can set bounds to it. The human degree of mind imagines, plans, arranges, but the Infinite Mind thinks and keeps all things into existence. Mind is the seat of life; the Infinite Mind the centre from which life proceeds on its errand of love or creation.

MOUNT JOY, PA.

SOMETHING MORE ON PENDULOSITY.

In the June *Microcosm* we printed a letter from Prof. Reagor in opposition to Prof. Kirby's position, namely, that a pendulum does not rest for *any period of time at all* at the ends of its swings. We were free to confess that we were somewhat at our wits end to decide the question after Prof. Reagor's broadside; and we accordingly invited any reader to help us out of our trouble if he could do so in a few brief paragraphs. After a number of attempts from professors of Natural Philosophy and others, we are pleased to present the solution of Prof. Wilmer of Chatham, Va., who, in our judgment has made a centre shot, and consequently Prof. Kirby is right after all. Here it is:—

To the Editor of the Microcosm:

DEAR SIR,—I submit the following in answer to Prof. Reagor's argument upon the "Pendulosity" controversy.

The key to the solution of the difficulty may be stated thus: As a "point" in space has position only and no magnitude, so a *point* of time is in reality no time.

The fallacy of Prof. Reagor is in attributing

magnitude to a *point*. His argument may be well answered by the *reductio ad absurdum*, as follows: Imagine two bodies passing each other moving in contrary directions, and suppose two *points*, one on each body. Now it is plain that there must be a time when these two points are opposite to each other. It is equally plain that if these two *points* are opposite to each other for any length of time, however infinitesimally short, there must be a pause of corresponding duration in the passing bodies. It is of course absurd to suppose a pause in either of the bodies since by hypothesis they do not pause. There must, then, be a fallacy in this argument of Prof. Reagor, and it will be found to be what I have already intimated. If we attach magnitude to the two points upon the moving bodies, a corresponding *period* of time will be employed in the passing of these so-called points; but if we bear in mind what a *point really* is, it will be apparent at a glance that while there is a *point* of time at which the two *points on the moving bodies* are opposite, it is not and cannot be a *period* of time.

Apply this now to Prof. Reagor's argument upon the pendulum. It is true, as he says, that "there is a time when these two opposing forces become equal," but this is not a *period* of time as we see, being only a *point*. It is, in fact, *no time* at all. Hence, it would be more accurate, instead of saying "a point *of* time," to say a point *in* time. Very truly yours,

C. B. WILMER.

TRICHOTOMY.

NO. I.

BY G. H. MCKNIGHT, D. D.

The title of this article signifies the Trinity of man, or that he is three-fold in his nature, constituted of body, soul and spirit. I propose to consider the subject under the two following heads:

I.—Is this the Scriptural Doctrine?

II.—Is it Scientific?

The first question, Is it Scriptural? will be the subject of the present paper.

The question itself I regard of the greatest importance, because by this three-fold division only, as I believe, can the materialist be successfully met and answered. For if man is dual only, if he has only body and soul, or physical powers, and intellectual which are identical with spiritual, then it seems impossible to show that he is in anywise superior to the brute, except in degree, and hence he may be only the outcome of the brute, or a superior animal merely, as the materialistic evolutionist contends. But if he has a spirit which the brute has not, separate, distinct and independent of both body and soul or mind, capable of appreciating Divine things, and reaching the Divine image and likeness, then he has a nature which the brute has not, and which is infinitely above him. This I believe to be both Scriptural and Scientific.

Let us look then first at the Scriptural evidence. In the first chapter of Genesis we are told God created man in His own image and likeness. Not first as a moneron, or as a germ of the brute species, or as a brute in any sense whatever, but as *man* in His likeness. Thus it is written: "And God said let us make man in our image, after our likeness. So God created man in His own image, in the image of God created he him, male and female created he them."

Again, in the 2d chapter and 7th verse it reads: "And the Lord God formed man of the dust of the earth, and breathed into his nostrils the breath of life, and man became a living soul." Now in the Hebrew it reads: "the breath of lives," or as a mental philosopher renders it, "the breath of *two* lives." This then would seem to indicate natural and spiritual life. "Living soul" may be translated "living creature." But this "living creature" was constituted of body, soul and spirit, or in other words was Triune, and hence was in the image and likeness of God.

When God said: "Let us make man in our image, after our likeness," a plurality in the Godhead is certainly implied. For it is impossible to suppose that the Creator, would associate with Him, in this way any creature. It is manifest by such language He is addressing equals who share with Him the work of creation, and therefore we are either driven to polytheism, or the doctrine of the Trinity. The case is still stronger when we find Elohim (plural), in the 1st verse of this chapter connected with a singular verb, and when further on we find the word Jehovah Elohim, and then again the Spirit spoken of, all of whom are represented as exercising Divine powers and attributes, and all of which accords with a fuller and clearer revelation of the doctrine in the New Testament, of the Father, Son and Holy Ghost. This however is incidental, for it is not the doctrine of the Trinity that I am seeking to establish, but the three-fold nature of man. Of course if God is Triune, and man was made in His image, he also is Triune in his nature. But let us consider further the particulars of his creation.

I.—It is clear that his body was made of dust or clay. This then was matter.

II.—It is clear that something was added to this material form,—that in itself it had no life. This was the breath of God, which as we have seen included two lives. This is indicated by two Hebrew words *nephesh* and *neshamah*, the former meaning, as I believe, the animal soul, which man has in common with the brute, and the latter meaning the spirit, which is immortal. This seems clear from the fact that *nephesh* is repeatedly used in Scripture to denote the life or soul of the brute, but *neshamah* is not so used. There is another Hebrew word *rosach* which in our authorized version is translated spirit, and is found in that passage of Ecclesiastes 3, 21, which reads: "Who knoweth the spirit of man that goeth upward and the spirit of the beast that goeth downward." The word spirit is the same here (*rosach*) in regard both to man and beast, but it may be well doubted as another suggests, whether this refers to man's future life Another rendering of the passage is: "Who knoweth the spirit of man that goeth erect, and the spirit of the beast that goeth prone or on all fours." But the word *Neshmah* is not used, and hence man's highest nature is not here intended, though it must be admitted that *rosach* does at times denote this. But turning now to the New Testament, we find the doctrine of man's three-fold nature formally stated. In I. Thesa. 5. 23, St. Paul says: "I pray God that your whole spirit, soul and body be preserved blameless unto the coming of our Lord Jesus Christ." Here three Greek words are used, all having different significations—the immortal life or spirit, the animal soul or mind, identified with the brain, which the brute also has, and the physical powers or body.

At death the pneuma only survives; the psucha perishes with the body; but in the resurrection these live again and man in his integrity stands in the Judgment. Between death and the resurrection, man is a disembodied spirit, although I fully believe with the author of "*The Problem of Human Life*" that the spirit assumes form at death, which is really a counterpart of his visible appearance while in the body.

But again it is well to observe that this view of the passage in Thessalonians harmonizes with St. Paul's teaching elsewhere. In I Cor. 11, 14 he says. "The natural man, (*preuchi kos anthropos*) receiveth not the things of the Spirit of God, for they are foolishness unto him." The natural man here might be rendered the soul-man, and this seems to be synonomous in meaning, with the carnal mind spoken of elsewhere. The natural man or the carnal mind does not receive the things of God. Why? Because they are spiritually discerned. The carnal mind, as this same Apostle says in Roman 8, 7, is enmity to God, that is, the mind of the flesh, or we might say the mind of matter. What is this but the psucha, which is the animal soul or mind and has no capacity for spiritual conceptions, ideas or aspirations. I am aware that the usual interpretation of the Apostle's words is that the carnal mind is the mind or soul made gross and vile by sin. But so long as he makes the distinction himself between the soul and spirit, (pneuma and psucha) it seems to be a better interpretation, and one which throws more light upon the whole scope of his teaching, to make the carnal mind identical with the psucha, or animal soul. There is one other passage to which I desire to refer before closing this argument for the three-fold nature of man from the Scriptural standpoint. This passage is found in 1 Cor. 15., in which St. Paul makes his famous argument for the resurrection. No part of this chapter has given rise perhaps to more controversy than what he says in the 44th vs. "There is a natural body and there is a spiritual body." The Greek is literally a soul-body and spirit-body, or body of the psucha and body of the pneuma. Now then—may not the apostle mean this? There is a body or form which the spirit takes on at death, a body ethereal, spiritual, akin to the spirit itself. But there is another body which perishes with the soul, in the grave, yet which shall be restored in the resurrection at the last day. Mark the language of the writer here, the present tense is used. "There is a natural body." That body now exists. But so there *is*, not that there will be, but there *is* a spiritual body, a body now existing. This view would accord with that of Ulrici to which Joseph Cook refers in one of his Boston lectures. This body he regards as the enswathment of the soul, non-atomic and immaterial. Whether this is the true view or not, it is evident that St. Paul teaches the trinity of man. It is further evident that the soma and the psucha are material, though the latter may be of a much higher order than the former; indeed from matter in its grossest form to its most refined and sublimated, the distance is almost infinite, approximating so nearly to the spiritual that the distinction between the two may not be discernable. So that when Ulrici speaks of a body non-atomic and immaterial, he offers us a mere speculation. For after all, how little we know of matter and spirit, the most profound analysis leaves us still in the dark as to their real nature, or as Huxley suggests, both matter and spirit may be only names for the unknown and hypothetical cause of states of our own consciousness. These thoughts however lead us to the consideration of the subject from the scientific point of view, which is to be the theme for my next paper.

THAT $5,000 CASH PRIZE AGAIN.

Editor of The Microcosm:

Dear Sir:—I have noticed in several numbers of *The Microcosm*, during the volume just closed, reference to an offer from Mr. Joseph Goodrich of $5,000 to any one who would demonstrate the correctness of the law of interference as taught by the advocates of the wave-theory—that is, to produce silence by sounding two unison instruments together. I have the satisfaction of calling upon Mr. Goodrich for his check, for I have found two unison instruments which exactly fill the requirement. They produce powerful tones and in the same key, but they can be brought together in such a way as to cause interference and thus produce absolute silence. I have tried the experiment repeatedly on different individuals of acute faculties, and the result has been a success every time. I have many witnesses here who will testify to the fact of absolute silence caused by sounding these two instruments together, and if Mr. Goodrich is a fair man he will shell out; or if he doubts let him drop down to Shreveport and be convinced.

The two instruments to which I refer are *The Microcosm* and the *Problem of Human Life*. They are in exact unison, producing the most piercing notes I have ever listened to; and their interference is most marked with evolution and materialism, causing intense silence on the part of Darwinians, but especially theistic evolutionists of the Joseph Cook and Dr. McCosh type. I have tested this unison music in their presence, and the Double Siren of Helmholtz is nowhere to the demonstration. These instruments also produce the most death-like silence whenever sounded in the presence of our college professors who have just been teaching the wave-theory of sound to their classes of physical science, and especially if they have just chanced to repeat Tyndall's tin-tube experiment, or his illustration of the effect of a sound-wave in destroying the village of Erith! The silence of such professors under the interference of these notes is really mournful. You can hear a pin drop. I appeal to you Mr. Editor, if I am entitled to the $5,000 prize.

Truly Yours,
A. R. Booth, M. D.

Shreveport, La.

MECHANICAL TELEPHONE.

Cedar Rapids, Iowa., July 8.

Ed. Microcosm,

Dear Sir:—Have just received the July number of your excellent paper. I notice the letter of Prof. Chamberlin respecting the remarkable effect of an Acoustical Telephone, by holding the wire between the teeth. I have often observed the same thing, and furthermore have attached a branch wire to the main line, then stood at right angles to the line, holding the branch between my teeth and heard distinctly the messages passing over the wire. The greater the tension of the branch the more audible the conversation. Can the wave-theory on any principle of philosophy explain this division of sound?

Respectfully Yours,
T. H. Blank.

WILFORD'S MICROCOSM.

23 Park Row, New York, August, 1882.

A. WILFORD HALL, Ph.D., Editor and Prop'r.

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ONE YEAR AGO.—RETROSPECT.

A year ago this month we made the most important venture of our life, in throwing to the breeze the banner of our little *Microcosm*. We then saw the future as through a glass darkly. The *Problem of Human Life*, in its revised form, had been before the public for nearly a year, and its many new departures in science, with its novel arguments against evolution and materialism, had struck a popular chord whose ringing vibrations warned us unmistakably that more of the same sort was wanted. We were led to believe that a live religio-scientific journal, whose management should not be afraid to call in question popular theories of science because of their venerable age, or that should dare to advance and defend new views of philosophy even in the face of the most renowned authorities, was not only a necessity of the times, but an enterprise that was destined to meet with warm encouragement from wide-awake thinkers throughout the land. We are gratified beyond measure to feel and thus publicly to announce that we have not been disappointed. Our experience during the year just closed has convinced us that even if the wish originally was father to the thought the child has outgrown and surpassed its progenitor. We had formed no true conception, inclined as we are to become enthusiastic, of the favor and fervor with which the new journal was destined to be received. A year ago our friends predicted adversely to the prospective success of our venture; but in the midst of these foreboding prophesies a still small voice kept constantly whispering: "They are mistaken; such a medium of reaching the public is needed; your *Problem* has already demonstrated its necessity, the harvest ripens, thrust in the sickle." We gave heed to the silent monitor, but with what anxiety we sent out the first number containing our Salutatory, no mortal save one will ever know, for words are inadequate to describe it. And then, with what patient faith and prayerful hope we counted the days, as we waited for the verdict of the friends to whom we had sent specimen copies, we need not here try to record, as it would be impossible. Suffice it to say, the oddly attired little visitor, received at first with suspicion and strange doubts as to its real intention, was, on a little acquaintance welcomed with open arms and in thousands of homes given the place of honor at the table. In a word, the enterprise was a success and the success was a triumph, and before the second number had been mailed more than 2,000 names of enthusiastic subscribers were on our books, while from that time on till near the close of the volume an average of thousands of subscribers a month regularly augmented our lists, among whom were not less than 7,000 clergymen. The feelings of those subscribers, as they read number after number of *The Microcosm*, can be judged by the hundreds of excided letters received monthly at this office, specimens of which, as "Kind Words," have occasionally appeared in these columns.

But the first campaign has now come to a close and has terminated gloriously for the cause of truth, with victory written all over the Microcosmic banner, which, in a score of regular en-

gagements and as many more skirmishes has not once been lowered to the foe. We throw it anew to the breeze and in open view of the ramparts of the enemies of religion and true science, and now call upon the veterans who have so efficiently accompanied us and supported our work during the year just closed, to renew their allegiance to *The Microcosm*. We also ask for new recruits who have witnessed our mode of warfare and seen the smoke of the battle at a distance, men who shall now be willing to enter the ranks and share with us the glory and the spoils of another campaign. Officers and men! the first artillery discharge accompanies this brief address. It is the signal for desperate work. The foe lurk in ambush. They must be routed. Let us stand shoulder to shoulder in the inevitable events of the coming year, and at its close we hope to recount in our next Retrospect even grander achievements and richer spoils than those of the past. God bless you.

SPIRITUALISM.

In a former number of the *Microcosm*, in answer to Dr. Covert, we expressed not only a willingness but an anxiety to be convinced of the truth of modern Spiritualism, that is, of the supernatural facts upon which it claims to be based. This we wrote, not as a theologian but as a scientific investigator, having reference alone to the said alleged facts of materialization, table-tipping, etc., claimed to be the work of actual spirits separated from corporeal organisms.

Our able contributor, Rev. Dr. Geo. H. McKnight, of Elmira, N. Y., warns us kindly but earnestly against conceding too much for a system of religious belief whose fruits are only evil, and that continually. We were not aware, however, that we had conceded anything, but rather supposed that we had denied in positive terms the truth of the very foundation-facts upon which this extensive religious organization is based; and we even challenged their mediums to come to this office with their batteries and call up their spirits from the vasty deep and tip over our table if they can, assuring them and the public that as editor of *The Microcosm* we would not be afraid to state what was actually demonstrated as scientific facts.

If Joseph Smith, for example, Editor of the Latter-Day Saints' *Herald*, has access to the Golden plates claimed to have been found by his father near Rochester, N. Y., and from which he and his brethren believe the *Book of Mormon* to have been translated, will bring those plates to this office, we shall be only too glad to subject them to a careful scientific examination and then give an honest statement of the facts as to their genuineness, if we think so, without fear or favor. This we should do in the interest of science alone without reference to their doctrine as a religious system, or to the evil excrescences of Mormonism, such as Polygamy, which have evidently been added by the Salt Lake branch to their religion since Joseph Smith, Jr., claimed to have discovered those plates. It is the mission of *The Microcosm* to develop scientific facts and philosophical truths, and present them to the public, believing that facts of science and truths of philosophy, properly understood, can do no harm to true religion, nor prove injurious to the well-being of the world.

Dr. McKnight also sends us a very able sermon against Spiritualism preached by himself to his church, and which has been printed and should be widely read. It shows up the evil tendencies of that religious system in a kindly but scathing light. We note however that the preacher does not deny the supernatural facts as claimed by spiritualists, but attributes them to evil spirits or demons, in fulfillment of Paul's prediction, "that in the latter days some shall depart from the faith giving heed to *seducing spirits* and *doctrines of devils*."—I Tim. iv, 1. Now this is, in our opinion, a stronger concession to the claims of modern Spiritualism than is warranted by science or truth. We believe that the "seducing spirits" prophesied of by the Apostle, are "spirits" in the bodies of the false teachers, and that the "doctrines of devils" are the devilish doctrines these false teachers promulgate, and that the Apostle foretold nothing supernatural or miraculous in this prediction as to occur in the latter days. Dr. McKnight therefore makes far more dangerous admissions than we have done, for we firmly believe that every pretended physical act of disembodied spirits, as claimed by mediums, can be fully disrobed of its supernatural character and its fraudulent origin made apparent by means alone of cool-headed scientific and mechanical investigation, though we are anxious to be convinced to the contrary. Hence our challenge to the best test-medium in the world to come to our office and turn over our table by touching it with the tips of his or her fingers. Bro. McKnight insists, as we understand him, that there is as much proof of a personal being called *Satan* as there is of a personal God. If this be so, and if the devil be at the bottom of Spiritualism, as he insists, then we ask only the supernatural exhibition of his cloven foot or any other personal view or act of his satanic majesty, and we will esteem it a scientific overthrow of materialism, as conclusively demonstrated as if our own father should step out of the grave and personally greet us. Physical and supernatural manifestations from the *devil* would be just as good scientific evidence against atheism and materialism as would be a miraculous manifestation from God himself; for surely the absolute proof of a personal, entitative devil, outside of corporeal organism, demonstrates the existence of

a personal God to all intents and purposes. The great question of this scientific age of doubt and scoffing at religion, is this: Is there any conscious personality at all, either of God, man, angel, or devil, outside and independent of corporeal organism? Settle this question in the affirmative to the satisfaction of wide-awake scientists, and materialism vanishes. Give us one indubitable fact showing that any kind of conscious intelligence can exist and act outside or independent of a physical body, and it settles the question even with the most virulent atheist, that man shall live personally in another state. When this question is placed beyond all dispute among scientific investigators, it then becomes important for every honest thinker to decide what system of religious ethics, morals, and worship is best fitted to man's estate as well as to the character and attributes of the God and Creator of the universe whose existence will be thus demonstrated? Such decision it will not be difficult to come to with the aid of a reasonable amount of intelligence. We are totally sick and tired of the trickery practiced at *seances* to gull the superstitious and ignorant, the pretended writing with concealed pencils, tipping of tables without the aid of hands in the flesh, or other corporeal machinery. We are disgusted with the fanfaronade of professional mediums after the repeated exposures of the materialization frauds that have been caught with the drapery of angels in the shape of false faces, false hair, false teeth, and false hearts. Mr. Kiddle, the former Superintendent of Schools in this city, left his exalted and profitable position to act upon his convictions as an avowed believer in Spiritualism. We believe he was honest, as every act of his life shows. Then is it possible, the spiritualist asks, that a man so intelligent, so thoroughly educated, and so honest, could be deceived by a lot of table-tipping, pencil-manipulating frauds? One would suppose not. But if there were physical manifestations accessible sufficiently demonstrative to convince such a man, they ought now to be accessible and still strong enough to convince others, especially those who are willing to be convinced. Here, then, is a chance for a boom in Spiritualism. Let Mr. Kiddle collect three of his best mediums, bring them to this office, 23 Park Row, and produce one corporeal demonstration, such as tipping a table, moving a chair, or writing with untouched pencil, that we cannot fairly account for without the aid of supernaturalism, and we pledge ourself to announce the fact in the next number of the *Microcosm* to more than fifty thousand readers. Let advocates of the doctrine, who boast of millions of believers in the United States alone, make a note of this offer.

☞For terms to Agents, Clubs, etc., see 3d and 4th pages of cover.

MYOPY, OR SHORT-SIGHTEDNESS.

This is now conceded by all careful observers to be a growing physical defect which seems to be an almost inseperable accompaniment of advanced civilization.

The more barbarous or savage a people, the keener is their eyesight, and especially is this true with regard to the aged. This seems to be mostly accounted for by the fact of the non-use of their eyes in reading and writing, and other close applications to minute objects. As nations advance in civilization the percent in cases of Myopy increases among the masses; while it is also a statistical fact that the more cultured are the classes, both male and female, even in civilized society, the larger is the proportion afflicted with this growing defect, because the more cultured and refined are the people, the more are they supposed to posses wealth, and hence, leisure for the application of their sight to reading, etc.

It is further observed that those occupations which require the habitual use of the sight upon very minute objects, and hence objects in close proximity to the eyes, tend most to produce Myopy.

The callings of the watch-maker, the engraver, the type-setter, and electrotyper, the hair-worker, as also the fine hand-lace workers, are, as a rule, more apt to produce this defect than those callings, wherein the sight is less closely applied. A friend tells us that in one electrotyping establishment with which he was connected, every man except one out of about twenty who had grown up to that trade, was to some extent affected with short-sightedness. Whereas laboring farmers as a class have good sight even to old age. Hunters and especially sailors are noted for their unimpaired vision and for seeing objects at a great distance, even in old age.

A difference in the degree of this defect can be traced also to Nationalities. The French and English for example, have a much smaller percent of cases of Myopy than the German. This is thought to be owing principally to the difference in the form of the letters constituting these printed languages. The indistinct, blurry appearance of the German letters must make them more difficult to distinguish than the regularly outlined characters employed in the two former languages. This is especially observable in reading very fine print with a poor light. So well is this fact, and its deleterious effect on the sight, becoming recognized by German investigators that there is a movement now on foot to discard entirely the national form of letter in all new publications, and to adopt the plain Roman characters used in English and French books. This will help no doubt, to counteract the difficulty, but the only safe and certain remedy is a return to barbarism as quick as possible, since such a thing as a near-sighted Indian is not to be found. This, however, we do not recommend, as we would prefer civilization even with its concomitant evils of tight boots, tight lacing, over-dressing, poor ventilation, politics, rumshops, cigarettes, bad cooking, and even *Myopy*.

THE N. Y. INDEPENDENT.

We copy the following which appeared in a recent number of the above-named paper:—

"A correspondent wants us to write a careful and critical review of Wilford Hall's 'Problem of Human Life.' He says :

"I see you speak in contemptuous terms of it. Won't you be kind enough to get some scientist of acknowledged ability to review that work and expose its fallacies? I know a number of teachers and preachers who are enthusiastic in their praises of this book. They think that it is the book of the age and that it is unanswered because unanswerable."

We must say No to the request. Our readers do not need such a review. We would as soon write a sober refutation of John Jasper's astronomy as of Wilford Hall's acoustics. It is only ignorance that can accept either and we do not write for what a contemporary calls '*ignorami.*'"

We had occasion to reply to a somewhat similar notice by the *Independent* in the November number of *The Microcosm*, and to present the self-consequential bigot who happens to have editorial charge of that paper in his true light before our readers. It is a downright pity that the proprietor of a journal who has the business ability to secure for it so wide a circulation, should be so easily imposed upon as to allow such a stupid self-stultifier to have control of its editorial columns. In his first notice of the book, he distinctly admitted that he had not read it, and he further declared that he would not read it, because it was evidently wrong. These are his words:

"Such a treatise we frankly confess we do not read, because it is certainly wrong and not worth the time of perusal!"

He thus decided that the book was "wrong" without reading it, and then decided not to read it, because it was wrong! A wonderful editor, this! He compares it to John Jasper's illiterate opposition to the Copernican system of Astronomy, and tells the *Independent* subscribers that none but the "*ignorami*" read the book (as an excuse for not reading it himself), when more than ten thousand educated clergymen own it and have read it with satisfaction, among whom are hundreds who take the *Independent*, and who are mortified, judging from the letters we are receiving, at the stupidity and bigotry of this slanderer of what he confesses to know nothing about. Hundreds also of Professors of Physics in our colleges have accepted "Wilford Hall's acoustics," and rejected the current theory of sound with contempt. Will the editor of the *Independent* name even one man, having a common school education, who has been converted to the views of Rev. John Jasper, of Richmond, Va.?

But we ought not to complain at this critic's not reading the "*Problem*," but rather, to rejoice that the *ignoramus* did not know any better than to stultify his condemnation of the work by admitting his ignorance of it, and thus sending out the antidote with the poison! We agree with him that it would be a total waste of his time should he undertake to read the work, for such a mind is not capable of profiting by, or even appropriating, anything so new in science. A man who can write as he does about a book he confesses never to have read, has a skull too impenetrable for even a Lesseps to bore through with his diamond drill. That daring engineer would as soon undertake an excavation in a corundum rock as to take the contract of tunneling such a head far enough to find anything resembling brains!

Since the foregoing was written we have received a copy of the *Kansas Herald*, published at Hiawatha, which makes the following sensible comments on the *Independent's* course after copying one of its diatribes against the *Problem*:—

"The New York *Independent* is one of the very few papers in this country that has spoken unkindly of the work, and to its own hurt. In its pretended review of the work it said: "Such a treatise we frankly confess we do not read, because it is certainly wrong, and not worth the time of perusal." It appears that the editor simply glanced at the title page and "went for it" without having read it. In one part of his review he says the work "is ridiculous in its pretensions." Here is an editor of a great paper who pronounces a treatise "ridiculous" before having read it, yet frankly confesses he never reads such books! How does he know whether its pretensions are ridiculous or not if he never reads what this book opposes. Hall's *Problem of Human Life* has received more complimentary press opinions, and letters of congratulation from LL. D.'s, D.D.'s, A. B.'s, and professors in the leading educational institutions of the country than has been given any work in our knowledge. Ministers of the gospel from all denominations, presidents of colleges and scientific institutions nearly everywhere prononuce the work simply unanswerable and revolutionary in tearing down the false theories of Darwin, Huxley, Hæckel, Tyndall, Helmholtz, Mayer, Spencer, Vogt, all of whom have worked so unceasingly to prove the nonexistence of God. Professing Christians ought to hail such a book with profound gratitude. At least should they read the work before condemning it. This, with the exception of such old cut-and-dried creed-mummies as Henry C. Bowen, they are doing."

Just as the foregoing was clipped we received the following letter from a Congregational minister and one of the *Independent's* "ignorami," which we copy for the benefit of fossilized editors in general, and to show them why it is that *The Problem of Human Life*, revised edition, has reached its 34th thousand in less than two years, a matter which has so puzzled those impenetrable philosophers:

Congregational Parsonage, Seattle, W. T.

WILFORD HALL,

Dear Sir:—With much satisfaction, mingled with wonder, I have read a *borrowed* copy of your "*Problem of Human Life.*" Through my book-dealer *I have ordered a copy for myself.* I think so highly of it that *I shall try to have all our Congregational pastors get it.* I consider it as introducing a new era in human thought, and *restoring religion to its rightful place in the minds of men.* My purpose now is, if I can command the time and strength from my regular professional duties, to prepare a course of week-evening lectures, bringing out portions of the arguments of your book.

Very truly yours, J. F. ELLIS,
Pastor Plymouth Cong'l. Church.

A PERTINENT QUESTION ON SOUND.

Rev. W. M. Wellman, of Wyandott, Kansas, puts the following conumdrum to those who believe that sound consists of air-waves, as taught by Tyndall, Helmholtz, and Mayer:

"If sound consists of air-waves why does sound travel through water which contains little or no air, four times as fast as through our atmosphere? And why does it travel through iron, which contains still less air than water, seventeen times faster than through air itself? If sound in air consists of condensations and rarefactions which generate

sufficient heat to add one-sixth to its velocity, as the theory teaches, does sound also condense and rarify the iron in passing through it, and thus generate heat enough to add one-sixth, or 3000 feet a second, to its velocity in that medium also?"

As Mr. Wellman is a Congregational Minister and one of the "ignorami" for which the editor of the *Independent* writes, the above conundrums are respectfully submitted to that advanced scientific (!) journal.

PROF. COX'S LETTER.

Pontiac, Ill., July 6th, 1882.

A. WILFORD HALL, Ph. D.

My Dear Sir:—Permit me through *The Microcosm* to present my congratulations to Lebanon Valley College (as well as to yourself), upon the honor mutually conferred in their public recognition of your invaluable services to the cause of science. I begin next week the work of teaching science in a Normal Institute (for teachers), and I have been looking through my text-books, marking the facts (!) that are not true. The poor books present a sorry appearance. And how it makes me smile to note the *confidence* with which these absurdities are presented! But I must try to be charitable, as I, myself, used to do likewise, and but for your help would be doing it still. I am now frequently led to the inquiry: Do the compilers of these text-books ever read? I have just received Dr. Avery's Elements of Natural Philosophy,—a new book finely written and beautifully illustrated, yet containing all the usual "bosh" about sound-waves, tympanic vibrations, &c., just as if it were science. If I knew the Author's address I would have you send him the first Volume of *The Microcosm*, and would write to him myself urging him to rewrite the Chapter on Gravitation, Heat and Sound. I was slow to admit that Newton was wrong in any sense upon the subject of falling bodies, but while I have tried to show him to be right and you wrong, I confess that you have left me nothing to stand on. I trust that before August, 1883, Prof. Mayer will be a contributor to *The Microcosm*, and an enthusiastic advocate of the true theory of Sound.

With congratulations.

Your Devoted Friend,

HENRY C. COX.

A SPECIMEN PRESS-NOTICE.

[*From the Troy Free Press.*]

[The following is but a sample of hundreds of similar allusions to *The Microcosm* by the press of the country, for which the editors have our thanks. Hall & Co.]

The "*Microcosm*," edited by A. Wilford Hall, New York, is one of the most interesting and truly scientific publications we have ever seen. Mr. Hall is also the author of that wonderful book —"*The Problem of Human Life*"—which has met with the largest sale, perhaps, of any book recently published. The *Microcosm* will change its form this month, and will be published at $1 per year. It is worth $10. Every article tells of some great truth, in plain lucid words, and old theories—such as the wave-theory of sound—are "upset" by this mighty man of the pen. The "*Microcosm*" has been published but one year, but its subscription list has increased incredibly fast. No man ever saw a number of this publication but that he liked it, and nine in ten who see a number subscribe for it; the other man hasn't the money.

REV. DR. PARR'S LETTER.

To the Readers of The Microcosm:—

Doubtless you have seen by notice in the last number of the volume just closed that the Editor proposes to republish the first volume of *The Microcosm* in book form bound in cloth, postpaid, for $1, if 1000 persons will send their names and will agree to take a copy when ready to mail, no money being required till so notified. In this form it can be preserved as a permanent and valuable part of our libraries, and will be uniform in size and style with the next and all succeeding volumes of this valuable journal. We have all, doubtless, tried to preserve newspapers for some valuabe articles they contained, but we know too well how poorly we have succeeded. I need not remind the readers of this paper that the first volume contains too many valuable discussions to be lost. Never has our holy religion met with such an invincible defender as *The Microcosm*. It has come to us every month in the form of scientific bulwarks mountain high, supported by impregnable batteries of truth from which have issued arguments of chain-lighning against the ramparts of materialistic science, tearing through their rotten timbers, going down to their foundation stones, and upsetting the entire superstructure as triumphantly as did Sampson overturn the Philistine temple.

Many of the contributions in the first volume have cost weeks of intense thought by as good brains as there are in this country, and contain many things new and grandly worth preserving. It would be like having the New Testament without the old to have the next volume in permanent shape and lose the first. We cannot measure the real value of knowledge by dollars and cents, as no comparison can be instituted. A single good thought is often of more value than many dollars in money. Allow me, then, earnestly to urge every reader to send in his name at once as a subscriber for the first volume as indicated that due arrangements may be made for its reproduction in book form. For one I feel that we cannot afford to do without it. At the same time let us use all dilligence to get others to do the same, as well as strive to increase the circulation of the forthcoming volume.

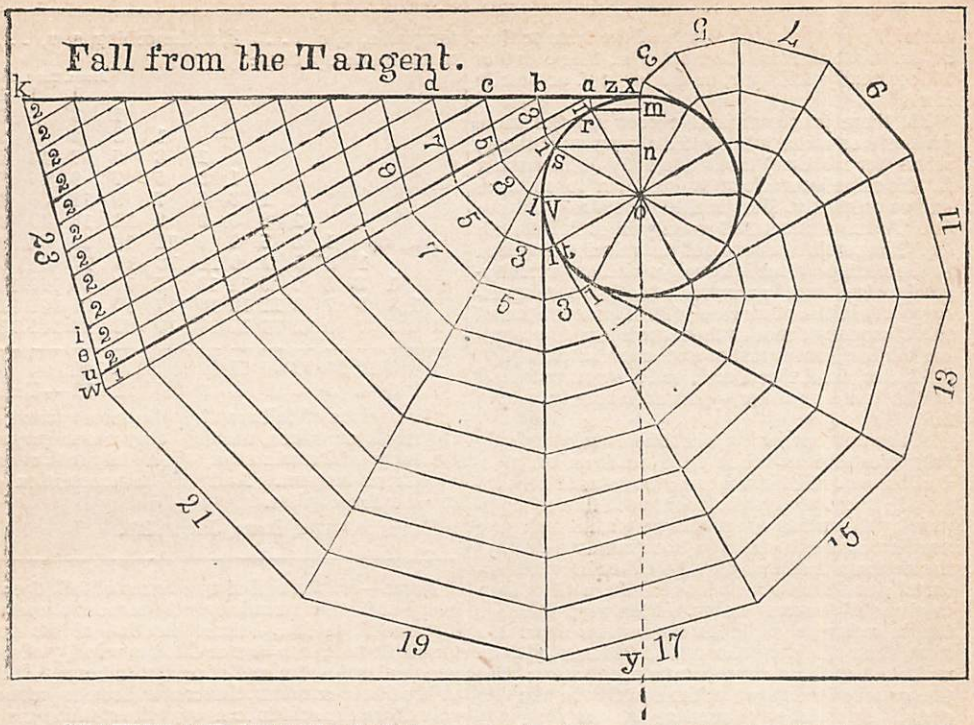
Very truly Yours,

J. N. PARR, M. D.

Jolietville, Ind., July 3d, 1882.

THE "SCIENTIFIC EDITOR" AGAIN.

There is fun ahead! The scientist of the *Standard* is urged by his readers to explain Newton's "demonstration" of the moon's fall from the tangent. He positively promises that he will undertake it! We know those readers well, and see the point of their adroit request. Thousands of them read *The Microcosm* and are sure of a scientific circus, if he makes the attempt. But we suggest that he first read Prof. Goodenow's "truer demonstration" printed elsewhere, and his total abandonment of Newton's "method" as "only a rough measurement," and he may conclude to save himself and the *Standard* another humiliating confession.



GRAVITY AND THE TANGENT.

New Discovered Method of Measurement.

BY REV. PROF. SMITH B. GOODENOW.

On the day I received the June *Microcosm*, I hastily wrote and sent my answer to criticisms of the Editor on the *measurement of fall from the tangent* of an orbit (or of any circle). The substance of it was this: That the orbital fall from tangents is the same amount as in direct perpendicular fall, (viz. as *square* of the time,) *by necessity of the Second Law of motion* (for Composition of Forces;) which fact is *shown* (not caused) by measuring from the starting tangent down to the different points reached on the orbit. And that, though this mode of measurement is imperfect when carried too far, yet *the imperfection of the mode of measurement does not impair the exactness of the value measured*, as being throughout in precise accordauce with the squaring law of the motion (rudely shown by this rough measurement, but not dependent upon it.) Since forwarding that paper, which is an all-sufficient reply to the objection offered, I have studied to see if there were not another mode of measurement, *exact* for the whole circle, which would demonstrate to the eye of a common thinker the truth of the law, as already seen without such aid by every expert mathematician. And I have discovered such a method, which I now explain.

Let it be observed, then, that the measurement from the tangent *perpendicularly downward* is not the exactly correct method, but is only roughly used as sufficiently accurate *for a short distance* from the starting tangent. The fall is truly all the time from that point of the tangent which the body would have reached if not deflected, in a direction not perpendicular but *toward the center*. And therefore, the line of fall from the tangent is not properly a straight but *a curved line*, more and more curved the longer the time it covers; until at the end of the circuit it has formed a complete *spiral* returning to the starting point and commencing over again. This will appear thus:

Divide the circle or orbit into any number of equal intervals, say 12 parts of 30° each. At each of the 12 points of the circle draw in exact tangent, in the direction in which the body moves on the orbit; and set off on these tangents the same intervals as on the circle, the whole 12 on the first tangent, 11 on the next, 10 on the next, and so on, till the final tangent has but 1 distance. (Be careful to make the whole 12 intervals or circumference length on the tangent reach 6.283 (or almost 6.3) times as long as the radius, each interval *as arc* being a very little longer than the value taken by dividers as *chord* on the circle.) Now join each point on the circle with the nearest tangent point marked, and that with the point over against it on the next tangent, until all the curves and the final spiral are complete, (as in the figure.) The body, which, starting from x, the beginning of the first or whole circumference tangent, would without gravity have moved to a, b, c, and finally k, revolves instead to r, s, v, and finally back to x, in the times or terms 1, 2, 3, on through a whole revolution.

In passing along any one interval of the circle, the descent of the revolving body consists of (1). The new fall 1 from the tangent of that interval, being the new effect of gravity, the same each time; (2). The fall of that tangent itself from the previous tangent, by difference of direction or *curvature*, *i. e.*, from 1 to 3, a fall of 2; (3). The same fall 2 of that from the next tangent before, *i. e.*, from 3 to 5, and so on, up to the first tangent, making the fall during one interval to be 1 and as many 2's as there have been intervals preceding it, viz., 1 or 3 or 5 or 7, or some odd number, as the case may be. The successive intervals passed over thus give a succession of the odd numbers 1+3+5+7, &c.; the sum of which at

each interval gives the *square* of the term or time as the total fall from the start, viz., 1 or 4 or 9 or 16, or finally 144, (a r, or b s, or c v. or finally k x.)

All these processes and values are the same precisely as when a body falls perpendicularly, when (for instance) this same body falls from x in the same intervals of time, down to m, n, o, and so on past y. For, in that case also, we have (1). The new effect 1 of gravity in each interval; (2). The retained effect 2 of the velocity acquired in the next previous interval, which as velocity-*acceleration* here answers exactly to tangent-*curvature* in the other case; (3). The repetition of this 2 as many times as there are intervals preceding the last; which makes up the term-falls 1+3+5+7, &c., total 1 or 4 or 9, or 16, or other square of the terms or times,—just as before in orbital fall.

When any one insists, that the revolving body falls in each interval only the uniform value 1, *i. e.*, its *new* fall from the new tangent of that interval; then he must be reminded, that to compare by this mode of reckoning with direct perpendicular fall, he must in like manner take only the uniform 1 of *new* gravity effect in each interval; and the two modes of fall are thus seen to give still the same value. If the perpendicular fall is reckoned with its *acceleration* from the start, then of course the orbital fall must also be reckoned with its *curvature* from the start; and the comparison shows a like equality in the two cases. To insist on comparing the *one fall from the start* with the *other fall from term to term*, is evidently most absurd.

The point k is where the body would have been after the time of a revolution, had no gravity existed. But by reason of gravity it has fallen, first 1, then 3, then 5, then 7, &c., up to 23 distance; until it is by a spiral motion of 144 back at its starting point x at the end of a revolution, ready to begin anew. The unit fall 1 is the fall in the first interval of time; which occupying here 1-12th of circumference, or 30° has its *sine* rm=.5 of radius, and its *co-sine* m o=.366, and its *ver-sine* x m, or 1—*co-sine*=.134, which is about the same as the 1 fall from tangent, a r. This .134 x 144 gives (19.296) over 19 times radius as the total fall from tangent in one revolution of a body. If we make much smaller intervals, say $\frac{1}{6}$ of a degree, we get this more accurately $19.738=\frac{\pi^2}{2}$.

While the arc is short, as x r, the fall from tangent a r, or perpendicular fall x m, corresponds about with x m′, the *ver-sine* of squared ratio to the *chord* of travel x r; so that the common method, of taking the *chord* and its *ver-sine* (in place of the arc and its exact tangent fall) answers *practically* in place of this truer demonstration here given. But farther along, at s, the perpendicular fall xn= the orbital b s, reaches *below* n′, the *ver-sine* terminus opposite s; and at v, it falls still farther below, to o; and so on.—(*See Note.*)

That the orbital falls a r, b s, c v, &c., are the same squared values as the perpendicular falls x m, x n, x o, &c., is obvious thus: Drawing a u, b e, c i, &c., parallel to r w, we have a u everywhere cutting off the new tangential fall 1, b e everywhere cutting off tangential increase 2, (because a b is twice a z,) and c i everywhere cutting off 2, and so through. Whence, the falls from a, b, c, &c., to the next tangent are 1, 3, 5, &c. And the same is true between every two tangents. Hence, the *total falls* from the first tangent a, b, c, ... k, to the orbit r, s, v, ... x, are made up thus:

										Items.	Total.	Term.
										1	1	1
									1	3	4	2
								1	3	5	9	3
							1	3	5	7	16	4
						1	3	5	7	9	25	5
					1	3	5	7	9	11	36	6
				1	3	5	9	9	11	13	49	7
			1	3	5	7	9	11	13	15	64	8
		1	3	5	7	9	11	13	15	17	81	9
	1	3	5	7	9	11	13	15	17	19	100	10
1	3	5	7	9	11	13	15	17	19	21	121	11
1	3	5	7	9	11	13	15	17	19	21	23	144	12
1	4	9	16	25	36	49	64	81	100	121	144		
1	2	3	4	5	6	7	8	9	10	11	12		Term.

The values of fall are thus the same *squares* of the terms or times, whether they occur *perpendicularly with acceleration*, or *orbitally with curvature* from tangent. And the demonstration of the law is complete.

BATTLE CREEK, Iowa, June 14th.

NOTE.—At the end of two terms of fall, the velocity of fall per term is ever the same as the whole distance fallen, i.e., 4 times the fall of the first term. So that, x n=b s or 4 is the velocity of perpendicular fall at n and of orbital fall at s. If the unit value be so taken, that x n or 4 comes just half way down the radius to n′ opposite s, then b s will be lessened to b′ s′ or 4 a little to the right, and x s will be a little lessened to x s′; and $\frac{1}{2}$ x s′ or the *velocity of revolution* per term will be the same value 4 (or $\frac{1}{2}$ radius) as the *velocity of fall* per term at s′ and n′. (This is shown at §151, Cor. 1, of the new text-book of "Mechanics" just issued by Prof. C. J. Kemper, of Bethany College, W. Va., —an excellent work by the way, of one who uses *The Microcosm.*) This velocity 4 being then $\frac{1}{2}$ radius is ($\frac{1}{2}$ of $\frac{1}{6}\cdot\frac{2\,8\,3}{=}$) $\frac{1}{12}\cdot\frac{1}{6\,6}$, instead of $\frac{1}{12}$ of circumference, as in the figure, giving 12.566 intervals instead of 12. But the total fall in a revolution, viz., 19.7392 times radius, or $(\frac{6-2\,8\,3}{2})^2$ being $\div$ 6.283 =3.14159 times circumference which is just half the circumference ratio multiplied into the circumference ratio. So that, the total fall is *just* $\frac{1}{2}$ *the square of circumference ratio* as compared with radius; just as any part of the fall is just $\frac{1}{2}$ the square of the corresponding part of the circumference regarded as its average velocity or arc of travel. And this *the squaring law* of fall, the same throughout, whether perpendicular or orbital.

The total fall being $\frac{1}{2}$ $(6.283)^2$ as compared with radius is, $(6.283)^2$ as compared with half-radius; so that, velocity of fall per term down at $\frac{1}{2}$ radius being $\frac{1}{2}$ radius, as just seen, *final velocity* down at (6.283) times as great fall, is 6.283 times the $\frac{1}{2}$, (same work §115;) viz. 3.14159 times radius, or $\frac{1}{2}$ circumference. That is, in the time of any orbital revolution, the body will reach a final velocity of fall equal to $\frac{1}{2}$ of circumference (per term of $\frac{1}{12\cdot 566}$th part of circumference;) which is *a final velocity of fall* 6.283 *times as great as the uniform velocity of revolution, whatever the intervals of time taken.* So that, with the 12 intervals of our figure, each interval being $\frac{1}{12}$th the circumference, the final velocity for such an interval is 6.283 times $\frac{1}{12}$, or *over* $\frac{1}{2}$ the circumference; viz., (1+23 at k=) 24 of the 144 or $\frac{24}{144}=\frac{1}{6}$ of the total fall of 19.7392 =3.2898 instead of the 3.141592 radii when n (just now) was put at n′ by having 12.566 intervals instead of 12.

REPLY TO PROF. GOODENOW.

On receiving the foregoing article and its accompanying diagram from Prof. Goodenow, we were puzzled to decide whether it was not intended as a prodigious practical joke on *The Microcosm*, so strangely odd and outlandish did the whole thing appear, as having anything to do with gravitation. At first it struck us as possibly a new departure in *conchology*, and intended as an improved system of development by which Haeckel's *moneron* might take a shorter cut to the *ascidian* via the nautilus and the snail family. But an hour's hard study convinced us that it really had reference, in a *round-about* way, to Newton's law of the fall of the moon from the tangent, and that the Professor seriously believed that he had struck a big thing in gravitation. After puzzling for another hour we came to the definite conclusion that in adopting this new departure Professor Goodenow had totally abandoned Newton's method, as well as his entire demonstration as an absurd fallacy, and that in doing this he virtually admits that we have been right from the start in denouncing Newton's moon-demonstration as "guesswork mathematics," and his formula of measuring from a fixed tangent as a pure invention having no natural or necessary relation to the accelerated fall of a heavy body on the earth's surface. Although he thus virtually abandons Newton, as will soon be clearly shown, he does it with such a reluctant grace that his efforts to maintain consistency excites one's pity.

He first tells us that his improved diagram was intended to "demonstrate to the eye of a *common thinker*" what is already clear to an "expert mathematician" by Newton's method; yet as *common a thinker* as we claim to be we utterly fail, after hours of serious application, to get head or tail of the calculation in view of the well-understood rate of acceleration of a stone's fall at the earth's surface; while we had not the slighest difficulty in understanding Newton's method, and so thoroughly understanding it as to see and expose its fallacy which Professor Goodenow, after a sturdy fight, is at last compelled to admit.

He next tells us that the old method of measurement, directly downward from the tangent "to the different points reached on the orbit," shows "that the orbital fall from the tangent is the *same amount* as in direct perpendicular fall," and consequently must be correct. He then tells us that his former article published last month, was "an *all-sufficient reply* to the objection offered" by us, and proves that the fall of the moon "throughout is in *precise accordance*" with the calculation, as if trying to let himself down so lightly from Newton's method that no one would find out that they had parted company, instead of coming out boldly as he should have done and making a direct confession that the old method, as well as the demonstration based upon it, was false and ridiculous. But immediately after this he begins to untie the scientific meal-bag and to let out the prodigious astronomical cat whose picture we have given at the head of his article. He proceeds to tell us that Newton's "mode of measurement is *imperfect* if carried too far," a thing entirely unnecessary to tell, though he would never have thought of admitting it had not *The Microcosm* forced him into it. Then, as if to show again that he had not wholly abandoned Newton's method, he adds that this "*imperfection* of the *mode of measurement does not impair the exactness of the value measured!*" That is, the moon falls as Newton claims, though his "method" does not show it! In other words, you may have an imperfect rod-pole, you may measure straight across corners, pay no attention to the curved lines of your neighbor's farm but cut into it by going in the wrong direction, "yet the imperfection of the mode of measurement does not impair the value measured," although you get a dozen acres of land that do not belong to you! But he gets braver as he advances, and to show that we have been right from the start in condemning Newton's so-called "demonstration" as a pure invention and a very "rough" one at that, he adds: "Let it be observed, then, that the *measurement* from the tangent *perpendicularly downward* [just as Newton and all astronomers since his time measured] *is not the exactly correct method*, but is *roughly used as sufficiently accurate for a short distance from the starting* tangent!" What is this but "guess-work?" The Professor is bound to prove *acceleration*, if not in the moon's fall from the tangent, at least in his own fall from Newton! So he adds: "The fall is *truly* all the time from the *point* of the tangent [not the point selected by Newton.] which the body would have reached if not deflected [though Newton got the *points* directly above the moon's various positions along its orbit], *in a direction not perpendicular* [as Newton ignorantly supposed] *but toward the centre.* And therefore the *line of fall from the tangent is not properly a straight* [as Newton innocently imagined] but a *curved line*, more and more *curved* the longer the time it covers"! Yet Prof. Goodenow tried at first to make it appear that his new method was substantially the same as Newton's! The truth is, there is no more resemblance between the two methods than there is between Haeckel's *moneron* and Huxley's *orohippus*. So widely different is the complex exhibit of Prof. Goodenow's diagram from the simple but absurd straight and perpendicular lines of Newton's formula now pronounced a "rough measurement," that it does not take an "expert mathematician" to see, if Goodenow is right then Newton must be wrong, and one of the weakest and most superficial blunderers that ever dabbled in mathematics, since not only every measurement in the two methods differs in *length*, as the dividers will prove, but also differs widely in its *point of commencement* on the tangent, in its direction after commencement, in its *form* (one being a straight line down, the other a spiral curve,) and finally in its destination or terminal results, one being "only *roughly* used as sufficiently accurate for a *short distance*," while the other is declared to be "a mode of measurement *exact* for the *whole circle*!" Yet "expert mathematicians" are expected to accept this new departure in place of Newton's "mathematical demonstration!" If Prof. Goodenow's diagram really represents the "truer demonstration," as he calls it, "*exact* for the whole circle," then manifestly it was a most shallow philosopher who could invent such a 'rough" and widely different measurement, and call it a "mathematical demonstration!"

In a former paper (February *Microcosm*) Prof. Goodenow charged us with not understanding Newton's "method," and stated that when "younger and greener" he himself was led to doubt Newton's demonstration, but had to take it all back when he became older and wiser. But now, alas! he has become "green" again, and abandons Newton's formula as "not exactly the correct method," but as one "rudely" approximating it, and "*roughly used* as sufficiently accurate

for a short distance from the starting tangent." In place of this "rough measurement" of Newton's, the Professor puts forward his own startling discovery which he modestly calls "this *truer* demonstration here given," just as if there could be such degrees of comparison in "mathematical demonstrations" as *true, truer, truest!* According to this advanced authority in mathematics, who has written a book on astronomy, we must expect, in wading through the *Principia*, to classify Newton's mathematical demonstrations as some *true*, some *truer*, and some *truest;* and this of course implies that some might be found that were *false*, some *falser*, and some *falsest*, and still all be "mathematical demonstrations!" But we will not press this matter too rigidly out of respect for the Professor's feelings.

Now in order to realize the true acceleration of Prof. Goodenow's fall from his former estimate of Newton's demonstration, all by the force of Microcosmic blows, let us quote a few sentences from a former article of his, as published in the May number of this paper. He there speaks of this same "rough measurement" of Sir Isaac Newton's as "the *mathematical demonstration* of an undeniable fact",—"*demonstrated mathematically* and *beyond all possibility of mistake*,"—"thus *absolutely settled by pure mathematics*,"—"*a fact mathematically and correctly proved* by *Newton* and by myself," etc. He complains also in that article because we did not publish a former letter of his in which this measurement by Newton perpendicularly from the tangent was the "chief decisive part of my letter," and adds: "Is not the fall of a body 16 1-12 feet, or 193 inches in a second, a well-known fact? Is it not a *real measure of gravity* at the earth's surface? And was it not with this as a *real true yard-stick* that Newton measured the fall of the moon each second from its tangent? And does not *this measurement* show that 193 inches per second of *gravity-fall* here is 3,600 times as much as the gravity-fall of the moon per second?" etc. And yet reader, sad to relate, all this "mathematical demonstration of an undeniable fact" "absolutely settled by pure mathematics" "beyond all possibility of mistake" as measured by the "real true yard-stick" of a line drawn perpendicularly from the moon's tangent, now turns out to be a "rude" and "*rough measurement*," "not the exactly *correct method*," but only *roughly used* as *sufficiently* accurate for a *short distance* from the starting tangent, and which is entirely superseded by "this *truer demonstration* here given" "*exact* for the *whole circle*!" The Professor's reasoning thus presents the sigularly interesting anomaly of the most important "mathematical demonstration" recorded in the *Principia*, as based on a formula "roughly used" and "not exactly the correct method," though "absolutely settled by pure mathematics;" a "rough measurement" "rudely" employed to determine a result "beyond all possibility of mistake,"—a "real, *true* yard-stick" which has to give place to a "*truer* demonstration!" This able defense of Sir Isaac is about as "infamous" as it would be to suspect him of being a little tricky in his *mixed* style of "pure mathematics" over which the scientific editor of the *Standard* cried aloud for "more bait," and about which Professor Hornung, of Heidelberg College, became tongue-tied in his pen! But leaving this self-stultifying aspect of the new departure under review, let us look into its merits as a "truer demonstration" "exact for the whole circle."

In the first place, we would rather be nothing at all than to be obscure and scientifically muddy: and we confess to our readers that we fail to see the necessity for the tedious array of figures and labored calculations presented in Prof. Goodenow's article if his position really embodies the elements of common sense, and if the moon's fall from the tangent, following his spiral lines, does really correspond with the simple acceleration of a stone's fall on the earth's surface. We will now undertake to show by unmistakable reasoning, without any such complex figuring, that this new departure must be erroneous —that it is vastly wider of the mark than the old formula of Newton which measured the same fall perpendicularly from the tangent to the various intervals along the moon's orbit, and which the Professor now calls a "rough measurement," "rudely" used as only "sufficiently accurate for a short distance from the starting tangent." To make this evidence so apparent that the youngest reader of *The Microcosm* may comprehend it, let us first understand distinctly how a stone falls directly downward, and its mathematical rate of acceleration,—not a "rough measurement" of it, "rudely" calculated as "sufficiently accurate for short distance," but the absolute rate as determined by observation and "pure mathematics."

Let us take *seconds* as the intervals of time, and the fall of a stone as 16 feet in the first of these intervals. The acceleration, then, of succeeding intervals, is as follows: For the next second the stone falls the same distance precisely as in the preceding second (16 feet) with twice this first fall (32 feet) added, making 48 feet for the second fall. In the third second the stone falls the same distance as in the last preceding second (48 feet), with twice the first fall (32 feet) added as before, making 80 feet. In the fourth second it falls the same as in the last preceding second (80 feet), with twice the first fall (32 feet) again added, making 112 feet, and so on for any number of seconds, each new fall increasing in distance over the fall of the last preceding second by just 32 feet. This simple mathematical statement of the ratio of acceleration in a falling stone is admitted by Prof. Goodenow to be correct, and is disputed by nobody. Then let the reader get a pair of dividers and proceed to measure Prof. Goodenow's curved or spiral lines of fall from the tangent to the different intervals marked on the orbit, which he now claims to be the "truer demonstration," "exact for the whole circle." Does the increase of departure from this fixed tangent to the moon's position in each succeeding interval, correspond with the unquestioned acceleration of the falling stone as we have here presented it? If it does not, then the new departure is a fiasco. We assert emphatically that the measurements do not so tally, nor do they come any where near it. Take the first two falls a r, and b s, to begin with, and apply the dividers to them, and it will be seen that the second fall, instead of being just *three times* as much as the first, in accordance with the ratio of acceleration in the falling stone, the second fall measures *four times* as much as the first! Surely a bad beginning for a "truer demonstration!" Whereas in Newton's "rough measurement," drawn perpendicularly from the tangent, the second fall, if short intervals be employed, happens to be exactly correct! In former articles, before we had exposed the fallacy of a fixed tangent, Prof. Goodenow insisted upon its absolute correctness as known to every one since the dawn of science. Now it appears there is a new

dawn in science and the absolutely correct method of Newton becomes "not exactly the correct method" but a "rough measurement."

But this first test is only the beginning of the trouble. Take the next two falls c v, and d t, and apply the dividers. Now if there were a real correspondence in these spiral falls of the moon from the fixed tangent with the succeeding falls of a stone, second after second, it is plain that the fall measured from d to t should be the same as the last preceding fall from c to v, with twice the first fall (from a to r) added; whereas the fall from d to t exceeds that from c to v by 7 times the first fall! Is this a "truer demonstration" than Newton's, which *aims* to make each succeeding fall of the moon tally with that of the falling stone as we have stated it? Though Newton wretchedly fails to keep up the correspondence, except for a short distance from the starting tangent, as Prof. Goodenow admits, yet he leaves this "rough measurement" recorded, and without apology to the scientific world calls it a "demonstration." Prof. Goodenow then slaps Newton's demonstration in the face by making his own second fall measure 4 times as much as the first, instead of 3 times, as Newton has it, and then, without apology for the insult, calls his own a "truer demonstration," and Newton's only a "rough measurement"! But even this is not the worst of the discrepancy. It increases with accelerated velocity as it proceeds toward k, where the last fall (from k around to x, the place of beginning) instead of measuring the same as the preceding fall, with twice the first fall added, according to "pure mathematics," exceeds it by more than 20 times the first fall! Yet Prof. Goodenow tells us in all seriousness that his is the correct method, "*exact* for the *whole circle*," and a "truer demonstration" than Newton's "rough measurement"!

In our reply to the *Christian Standard* in the June *Microcosm* we showed that Newton's mathematical demonstration, if carried beyond one half of the orbit, would involve the anomaly of the moon turning back *toward* the fixed tangent instead of continuing *from* it. In a subsequent number of the *Standard* the editor ridiculed such an absurd charge as an evidence of our ignorance. Yet Prof. Goodenow has adopted this very absurdity, and makes the moon fall not only *from* and *toward*, but *parallel* with the tangent in performing the complete spiral curve, and all the time he represents it as carrying out Newton's famous "fall *from* the tangent"! If a number of singular geometrical coincidences of measurement were necessarily a law of gravity, or could be shown to have anything to do with the moon's fall from an arbitrary tangent, then Prof. Goodenow would have a considerable of a demonstration. But unfortunately his figure is a mere combination of remarkable coincidences in the arrangement of geometrical lines about a circle that have no more to do with the earth's constant action upon the moon in pulling it uniformly from its rectilinear course, than had the sound-pulse in Tyndall's tin tube with the blowing out of his candle.

But this new departure involves a still greater absurdity. If Prof. Goodenow has a geometrical right to carry the fixed tangent out as far as to k, and thus make the moon's fall from it one entire spiral curve to the place of beginning, he has the same right to continue this tangent out another equal distance beyond k, and thus carry the spiral curve *twice around* the earth before reaching x, thus making the moon's fall not only *from*, *toward* and *parallel* with, but positively *around* and *across* the tangent, and call it all the time the "*fall from the tangent*"! And if it thus logically involves twice the length of tangent to k, and a spiral curve twice around the earth, then it will be a still "truer demonstration" should he carry it out a hundred times the distance of k, and thus make it perform a hundred complete spiral curves around the earth before reaching x! Precisely the same geometrical coincidences of measurement would still exist and to a much more alarming extent, but what they would have to do with the moon's uniform motion along its orbit would be the puzzle. Possibly they would tend to make "this truer demonstration" more obvious "to the mind of a common thinker."

In conclusion we refer the reader briefly to the argument in last month's *Microcosm*, which we presented at the close of our reply to Prof. Goodenow,—an argument, as we now aver, to which no kind of reply can be made. It was as follows: The moon's so-called fall, or continual departure from its ever-changing tangent or rectilinear tendency, *is necessarily the work of gravity alone*, without any assistance from accumulated velocity, since there can be no acceleration involved in such motion of the moon; while *not the one ten thousandth part of the stone's fall of* 16 *feet in a second is the work of gravity itself*. This, as the reader will recollect, we showed beyond doubt by figuring backward to a small fraction of a second, thereby proving that the stone does not realy fall by the action of gravity alone at a *velocity of more than the sixty fourth of an inch in a second*, the remainder of the 16 feet being solely the work of accumulated velocity with which gravity has nothing whatever to do. Yet it is a fact that Newton based his greatest demonstration—that upon which his reputation mainly rests—on this erroneous and superficial supposition that the fall of a stone 16 feet in a second was the work of *gravity alone*, or the "*real measure* of gravity on the earth's surface," as so distinctly repeated by Prof. Goodenow! There can be no mistake about this being the view of Newton and of all astronomers since his time, as Prof. Goodenow, in his article just referred to in last month's *Microcosm*, after all the warnings we had given him, bases his entire argument on the assumption that the stone's fall during one second, to use his own words, is the work of "*gravity itself*"! This argument therefore not only shatters Newton's chief demonstration, but leaves the entire position of Prof. Goodenow involved in a similar ruin, for how can there exist any natural or necessary relation between the fall of a stone, in which not the *one ten thousandth part* is the work of gravity, and the fall of the moon *in which gravity does the entire work?*

That the tangent cannot be fixed or maintained even for the small fraction of a second, from which to measure the moon's fall, is manifest, since the pull of the earth's gravity *would be backward*, instead of at *perfect right angles as it must be all the time* in order to *produce circular or orbital motion*. Hence the tangent must be changed every instant to keep up this *right-angle measurement of pull*, and consequently the fall of the moon from such ever-changing tangent must be an absolutely uniform motion as the work of gravity alone. Hence the correctness of our position that there is no sort of relation or analogy existing between the two kinds of fall.

In view of these overwhelming considerations what confidence ought to be placed in the philosophical judgement of men of science, however

great their names who, basing their calculations upon such self-evident blunders, formulate results which they sagely send out to the world as "mathematical demonstrations"? The question then recurs, is Prof. Goodenow prepared to acknowledge that in this argument we have "*the most stupendous overturn in science that the world has ever seen*"? He intimated distinctly in a former article that he would make this acknowledgement whenever we should prove Newton's demonstration to be false. Our readers are becoming impatient for this acknowledgement. Our excellent contributor, Thomas Munnell, A. M., of Mt. Sterling, Ky., writes us:

"I have read with much interest the July number of *The Microcosm*, and am greatly amused at the manner in which you have let all the gas out of Prof. Goodenow's balloon as he was soaring with Newton. The moon-theory has certainly 'gone where the woodbine twineth.' Your last point made against Newton and modern Astronomers, on the falling stone and the work of gravity not being more than the sixty-fourth of an inch in a second, is enough if you had nothing else, and settles the question beyond controversy. The work of destruction thus completed, the work of reconstruction must now begin, and I look with interest to see in what way mathematicians will go to work to calculate the true distance of the moon from the earth, and the true laws by which it is kept there. If ever I get time to go to New York again I shall give your hand a congratulatory shake for the work you are doing. I am anxious to see Prof. Goodenow's new discovery.

As Ever Yours;

THOMAS MUNNELL."

SKETCH OF THE EDITOR.

[*From the Phrenological Journal.*]

This gentleman has a large brain, measuring twenty-two and three-quarter inches, and it is able to use the nutriment which a well-balanced body weighing one hundred and seventy pounds could give it, but as he weighs fifty-five ponnds more than the requisite amount, his brain has a source of constant supply to give it extra vigor in emergencies. It is like a balance in the bank for a business man, a reservoir on a good mill-stream; when a supreme effort is required, the vitality is such that he can work two days and a night without very much suffering. In other words, he has a constitution that will endure hardship, labor, fatigue, and at the same time keep in a fresh and vigorous condition. Thus he is enabled to work always with a full head of steam in ordinary effort, and rarely comes to a point where all his vitality is demanded. Having so much of resource he could strike harder if he would, and oftener if required.

He has a very strong resemblance to his mother's family in his build, in his intellect, and in the power of his vitality. He has a feminine type of thought which gives him intuitive judgment of truth, without the necessity of always plodding; and then he has large Causality and Comparison, and the ability to reason sharply and soundly on subjects that are abstract; yet he is largely indebted to his ability to take as it were from an elevation a bird's-eye view of a matter, thus getting a general outline before he sits down to plow through it. When he starts into an investigation, it is after he has seemed to see the end from the beginning, and then the only labor he has to do is to put his sense of truth into logical form. This type of mind gives the ability to put philosophy and facts together and make them available.

He is remarkable for his memory. Whatever he touches sticks, and becomes incorporated with himself, and it is exceedingly easy for him to recall anecdotes and illustrative instances. He would have enjoyed Mr. Lincoln's little stories because they were always loaded with the honey of truth, and were generally sharp as the sting that protects the honey. He ought therefore to be good company for those who are permitted to be intimate with him, and he would be the life and soul of the company wherever he might chance to be, unless he falls in with a Gamaliel, then he would be as mum as a listener need be, and sit at his feet as Paul did, until he got all the master could give him.

He is a good student and a good listener; although when he gets started in talking and has a surrounding which needs instruction, he can fill the hour with his own thoughts and statements; yet if he meets a man that is his superior in any branch of knowledge, he knows how to be silent. He never has been accustomed to argue with men who were able to teach him, he would let them do the talking, but when he got away among those who needed the knowledge he would incorporate the new knowledge he had obtained with his old, and thus become a teacher to them.

He appreciates the droll, the funny, and knows how to scathe and scarify. He is remarkable for his Firmness; few men have so much. He is remarkable for his love of justice and his desire for the truth. He is more cautious than the majority of men, and anxious that his statements should be well based; and in argument would make a free citation of good authors, and back up his thoughts and principles with the wisdom of others, so far as he could; as a preacher he would quote from the Scriptures and from the Fathers, if they were as wise as reverend. In other words, although inclined to be original, he calls to his aid the knowledge of others wherever it can be made available.

His Approbativeness is uncommonly strong, and he suffers or rejoices greatly, as he may be approved or disapproved by those whose opinions are respected, and whose good opinion is to be desired. His Self-esteem is not wanting, hence, while he moves with apparent guardedness and modesty and sensitiveness respecting truth and other people's opinions of truth, he has a conscience of his own, and if he believes himself to be in the right he stands as firmly as possible, but never fails to get all the aid which the wisdom and experiences of others may render him. * * *

A. Wilford Hall* was born in Bath township, Steuben County, N. Y., August 18, 1819. His childhood was passed in great poverty, his parents with five children, being supported by the meager proceeds of day's work on farms by the father, in a wild, uncultivated country. Living on the coarsest fare and scantily clad in homespun garments, the product of the mother's industry, the subject of our sketch was required, as soon as able, to do farm work for the neighbors, so as to

*This sketch of the Editor's life was written for the *Phrenological Journal* by Mr. M. C. Tiers, the Artist. The foregoing phrenological description was given extemporaneously by Prof. Nelson Sizer, which was taken ver-batim by a short-hand reporter as here given. Prof. Sizer has done this work for the *Journal* for more than forty years, and during all this time, in thousands of examinations, has never once repeated himself.

aid in the support of the family. Education was out of the question, as there were no schools near, and no money to pay for the school-books necessary, to say nothing of helping to support the teacher. Consequently the family grew up in utter ignorance of even the spelling-book. Wilford was thirteen years of age, and scarcely knew his letters, when his mother's brother, Abner Hathaway, paid a visit to the then wilderness of Steuben County to spend a month in deer hunting. The deer were abundant in those forests then, and Abner possessed a new percussion rifle, the first of that great improvement over the old flint-lock which had been seen in that country. He was a good marksman, and it is hardly necessary to say that the Hall family had richer fare that winter than was customary, and they all looked up to uncle Abner as a real benefactor sent to their lonely log cabin from some far-off land of civilization.

During this winter's feast the uncle became attached to the almost naked boy of thirteen, and negotiated with his mother to let him go with him and drive horse on the Erie Canal, as the uncle was engaged every summer in doing a prosperous boating business in shipping lumber from Geneva to Troy, N. Y. The contract was not difficult to consummate, and the boy, with a substantial suit, obtained from funds advanced by the uncle upon his prospective wages, was off to Geneva to assume the responsible office of canal-driver, in which fortunately, very little "book-learning" was required for efficient service.

For five summers Wilford, known then familiarly as Aleck, plied the lash and curry-comb alternately to the horses in his care. But the small pay for which such service could readily be obtained, with the countless temptations to spend money, left nothing at the end of each season of exposure and toil, and the boy, now nearing the age of manhood, found time flying rapidly, with no intellectual improvement to fit him for the duties of man's estate. One moonlit summer's night he had a friendly chat with an Episcopal clergyman upon the deck of a boat as it was leaving Rochester. The good man gave him some earnest advice, in which he said that the young driver had a grander mission to fill than a life on the canal, and this led him to resolve then and there to quit the towpath forever, and try what there was for him of more importance in the wide world. He settled up with the captain of the boat for the small amount then due, some seven dollars in cash, and started on foot across the country for the forest home where his mother was still ready to receive the wanderer with open arms. A short visit determined his stay at the log cabin. In company with a younger brother he started on foot for Ohio, then the far West, to seek his fortune. The two walked for days in succession till out of money, then stopped and worked for a brickmaker till sufficient money was earned to help them forward on their way. While walking through the Western Reserve of Ohio, near Warren, the subject of this sketch struck his foot accidentally against a stone and sprained his knee so badly that it was impossible to proceed further. With the aid of his brother he succeeded in reaching the nearest house, and begged to be kept all night, assuring the owner that they had means sufficient to pay for supper and lodging. The proprietor of the comfortable log cabin consented under the circumstances, though he had previously refused to entertain any strangers even for pay.

This was the turning point in the life of Wilford. The host happened to be a minister and a backwoods doctor, as well as a school-teacher for a neighboring country school. In conversation with the boys he got their history, and became so interested in their adventure that he took pity on the lame tramp, and proposed that while the younger brother should pursue his journey westward in search of a place to pitch his tent, the disabled Wilford should make his home with him and go to school while earning his board by taking care of the cows and chopping fire-wood. This arrangement was gladly accepted, and the next morning the brothers parted, and while the younger was making his way toward Sandusky, the elder soon recruited, and commenced the first schooling of his life, being now about eighteen years of age. He pursued his studies night and day with great assiduity for a year and a half, and made such progress that he was advised to go for a term to the Farmington Academy, which was but a few miles distant. He settled with his generous friend, the doctor, and with such clothing as he could procure with the means he had managed to earn, he made application to the academy and was accepted. Here he applied himself with all his energy to books and to such labor as he could find to do. He cut cord-wood for a farmer in the neighborhood to earn money with which to pay his board and tuition, and made up lost time by studying at night to keep up with his class. For six months he kept on in this way, and at the end of the term received from the Principal of the Academy a certificate of qualification as teacher of a district school. This document proved a sufficient passport to the board of county examiners, who asked very few questions, and soon after settled him over about fifty scholars, many of them young men and women, and some far better qualified even than himself, as he thought, to teach the school. But his industry at night more than made up for his deficiency in some of the branches he was forced to teach, so that his defective education did not come to open exposure, although more than once suspected by some of the more advanced of his pupils. The school term ended creditably to the teacher, the trustees giving him a certificate of thanks. For years he pursued the same general course (studying through the summer and teaching through the winter months), until having become deeply interested in questions pertaining to the future life, he turned his attention to the study of the Scriptures, and finally entered the ministry.

For ten years he pursued the calling of an itinerant evangelist, holding meetings wherever an opportunity for doing good presented itself. During this period he wrote the work known as "*Universalism Against Itself*," having held by request many public discussions with prominent Universalist clergymen. The result of the publication of this book was a complete success, and so great was the demand for it that in two or three years, the author had sold more than 40,000 copies. The work was afterward published by the Methodist Book Concern at Cincinnati, many thousand copies more being sold. It has now been out of print for more than twenty years, although there is talk of the author's re-writing and re-publishing it. After his successful efforts with this book, Mr. Hall retired from public view on account of failing health, and engaged somewhat in secular pursuits, spending large portions of the past thirty years in the Rocky Mountain region of the far West. About three years ago, however, he came before the public again through

the publication of a book entitled "*The Problem of Human Life*," by Wilford, in which the Evolution, Spontaneous Generation, and Materialistic theories of Darwin, Huxley, Haeckel, and others were attacked with such force and with such novel arguments, that it at once attracted the attention of the religious world, and especially the clergy, who had become perplexed by the difficult problems raised in Darwin's works. But the most marked and surprising feature of this book was its attack on the current theory of acoustics, a theory never before called in question. The arguments of the best exponents of the theory —Tyndall, Helmholtz, and Mayer—were taken up, dissected, and severely criticised, their experiments denounced as false, and many of their most important statements of facts denied as having any foundation in truth. Whatever may be the merits of the positions assumed and the theories advanced in this book, the force and persistence with which the author sets them forth has compelled the attention and aroused the investigation of theological and scientific scholars and thinkers everywhere.

The book has had a most unprecedented sale, more than 32,000 copies of the revised edition having been sold in less than two years. As a natural consequence the wide reading of this book has caused much controversy in various religious and secular papers, especially concerning the author's attack on the current theory of sound, many professors of physics taking sides with the book, while others support the old view.

The success of his book and the open discussion of the scientific theories which it examines induced the author to start a monthly paper called *The Microcosm*, devoted to a general discussion of similar themes, and to be used as a medium through which he might reach the public ear in defense of his novel positions in science. His friends thought the paper would fail of support, and advised him not to make the attempt; but the first year of his paper is just closing, and so favorable has been its reception that an average of more than 2,000 subscriptions a month have reached the office from the commencement to near the close of the volume. More than 6,000 ministers of all denominations have their names already down on the subscription books of this paper. The last sensation of the author and editor is his attack upon Newton's law of gravitation. He is now in the midst of this controversy, and what the end of it is to be the forthcoming second volume of *The Microcosm* just announced, will probably determine. It is a daring venture, as Newton's Principia is among the largest game in received science which one may attempt to bring down.

Lebanon Valley College, at Annville, Pa., has just conferred upon Mr. Hall the Honorary Degree of Ph. D., or Doctor of Philosophy, in view of their appreciation of his scientific attainments.

MR. TIERS, THE ARTIST.

We are pleased to know that our brief notice of the "pleasant surprise" made us by Mr Tiers, as printed last month, is already bringing in many orders for portraits, keeping the artist busy executing them. One single commission from a wealthy Southern gentleman is for a painting of a family of eight persons, life size, on a canvass about 80x100 inches. It will be a grand work of art.

A RUSH FOR THE NEW VOLUME.

We are pleased to announce that as we approach the first of August the orders for the new volume, and the Memento of the Editor in the shape of a copy of Bostwick's superb photograph, are simply pouring in by the hundred daily. The new volume is already an assured success, although the good we propose to accomplish during the coming year cannot be measured in dollars and cents. Let every friend of the paper, and of the cause it advocates, send for circular of terms to agents and take a hand in obtaining additional subscribers. We can print and send out 100,000 copies easier than 10,000; and there are twice the former number of intelligent persons in this country who ought to be constant readers of this Magazine.

OUR FRONTISPIECE.

Although we employed what were regarded as first-rate artists to engrave the Editor's portrait, which appears in this number, and for which we paid a round price, we frankly confess that we are not enthusiastic over the picture. In fact we regard it as approximating a failure, as the thousands who have received Bostwick's photograph will probably agree. We confidently expected a fine picture, and but for want of time after receiving it, before going to press, we would have tried again. However, as a large majority of our subscribers are receiving the Editor's photograph free, as proposed on cover, the disappointment will not be so extended.

OUR MICROCOSMIC DEBRIS.

Our pages of Microcosmic Debris are unavoidably crowded out of this number, owing to the Gravitation argument occupying more space than expected. But that discussion will be shorter in the future and our characteristic "Debris" will make its accustomed appearance.

IMMORTALITY OF THE SOUL.

The article of Rev. Dr. Taft on this question, promised in last number, as well as other matters promised, must wait till next number. We have some important suggestions of our own to append to Dr. Taft's paper.

☞Agents will remember that we can keep no running account of subscriptions sent in. Such an undertaking would require an additional bookkeeper. Any premiums offered by us or commissions to agents, will be settled up as each remittance is received, and that ends it. This is better for the agent and vastly easier for us. If any one is working for a premium he had better retain the remittance till he has names enough, and send all at once. We have then only to enter the names on our books with proper credits, send the premiums and thus square the account.

OUR CONTRIBUTORS.

☞We shall keep the names of 40 of our hundred or more contributors in the list on first Editorial page. These names will be changed from month to month as articles from the different pens appear. No disrespect must be inferred from the temporary absence of any name, as they are all highly prized by us as well as by our readers.

WILFORD'S MICROCOSM.

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THE RELATION OF SCIENCE TO RELIGION.

BY PROF. W. H. SLINGERLAND, PH. B., M. S.

In this age of investigation, progress and discovery, the relation of Science to Religion is a question that touches the practical life of all thinking men and women. Skepticism and materialism, with their superficial ideas and arguments, are loud-voiced and arrogant. The solutions they present convince few and satisfy none. Only when Nature and Revelation are studied together can all phases of the problem be observed, the data be correctly interpreted and the true solution be evolved. Nature and Revelation, Science and Religion (they cannot be separated), together form one harmonious whole, conjointly they bear witness to their divine Author.

Men there are who, in the name of Science, would exclude the God of the Bible from the domain of the material universe, or at least imply that Jehovah does not *rule* the work of His hands, though back in the eternal ages past the circling spheres may have been spoken into existence by the fiat of His power. On the other hand there are men who in the name of Religion would cast contemptuously aside the testimony of Nature, and as vigorously endeavor to prove that there is no connection between the material and the spiritual.

The latter seem to think that the angel of Science, who comes among them unfolding a knowledge of the common things around them and of the mighty objects filling the abyss of space above and beneath them—that the angel of Science is an open foe to the faith which unfolded the spiritual and grasped the salvation offered in the Written Word.

But what is true Science? *It is knowledge; exact, ultimate, demonstrated, conscious knowledge, selected according to kind, and accurately classified into systems*?

Anything *called* Science that does not measure up to this definition is unworthy of the name. It is a definition that commends itself to the reason and judgment, and will be found universally comprehensive. "Science falsely so called" will utterly fail when measured by this rule, while true science will only seem the more convincingly true as item after item of the definition is applied to prove it.

Notice here a beautiful distinction. With God all knowledge is Science, for it is all exact, complete and perfect in the mind of Omniscience. Then let those who decry science and scientists deal in gentle words, for in this view—and the thought harmonizes with reason and sound judgment—in this view the omnipotent Father of all is the chief Scientist of the universe.

But with man, though all science is knowledge, not all of knowledge is science, as we have defined the term. Much that man knows is too imperfectly comprehended to merit the name of science, seen, as it is, as "through a glass, darkly." In fact, but little of the intellectual treasure in man's storehouse is so assuredly based on the rock of truth that it may not some time be borne away on the waves of time into eternal oblivion. It were strange indeed if some things which we think we know should not turn out on closer study to be largely made up of speculation and imagination. Nevertheless ten thousand things in our science stand out clear and strong and bright as truth herself, and shall so stand while time or mind endures. By positive experiments and severest tests they have been proven to be in accordance with the will of the divine Lawgiver of the universe; they are ultimate in their character, and the human mind can search no deeper into the essential essence of their being. There are those who oppose science and scientific investigation, fearing lest this line of thought should lead men to think less of spiritual things. This is indeed a radical error. The Book of Nature is as truly God's book as is the Bible. No one can faithfully read the one or the other without becoming a better man. The more one studies the works of God, the grander is the anthem of praise that they inspire. So exalting is the pursuit of science that it has been said, "An undevout philosopher must be mad."

Each truth comprehended by the human mind, each object whose relationship is understood, is in its way a revelation. This is true everywhere, in all science; and so every object on which law is stamped is a work praising God and showing forth his unbounded wisdom and his infinite power, whether such object be an atom or a world, a man or an arch-angel.

But let us not mistake the province of Science. There are certain things she teaches with force and clearness, but on other subjects she is as silent as the echoless past.

Search, if you will, the numberless strata of mother earth till you delve amid the central fires still burning since creation's dawn; pierce with telescopic vision the dark veil of space till firmaments in myriads burst upon your raptured view; resolve with the spectroscope the light of Sirius and Orion into its primal elements and characteristics; disintegrate by chemical analysis all the substances known to man, and though with each advance you will rise to higher conceptions and sublimer views of the glory and majesty of the great Jehovah, and a fuller appreciation of the beauty and magnitude of His kingdom, yet these alone can never speak the mystic words revealing in accents unmistakable the will of God to man.

Revelation alone marks out the path of duty for the human race. Revelation alone tells man how to approach the Majesty on high with acceptable offerings, and how to win favor in the sight of God and peace for his restless spirit.

Study for the sublime, aye, for the divine teachings therein contained, study, earnestly and with diligence, the Book of Nature, for it is the Book of God. But do not seek to draw from natural objects lessons God never designed them to teach. Seek not the minute details of Divine law as applied to humanity amid the circling spheres of heaven or the constellations of the universe. Not there, but in that special Revelation manifested to supply that very deficiency, has God presented to us an all-sufficient text-book of salvation.

Some become alarmed at the onward sweep of scientific discovery, become terrified as object

after object starts up from the ruins of the past uttering the special law of its being. And they fear that amid the pealing anthems of Nature's praise the sounds of bliss awaked by grace may be silenced and their faith swept away. God grant that a faith that startles at His works may soon be swept from the earth forever, and be succeeded by the faith once delivered to the saints, a faith willing to know the fulness of God and waiting to receive this fulness!

I bless and praise God that I live in an age when the angel of Science has rolled away the stone from the sepulchre of the past, and we see the glory of the Lord as it was never before revealed!

I bless and praise Him for the tender love manifested in Christ, for the revelation of the glory and majesty of His kingdom, and also for the providence that hath led discovery in all the paths of science, to strengthen rather than weaken the doctrines of the Cross.

Let us not fear the revelations of Science. If our religion is so unstable as to be in danger from the classification of truth as it is in Nature, then religion is unworthy our time and attention. But it is not so. Wherever men are strongest in religious belief, where the duties of religion are most perfectly practiced and its privileges most appreciated, there is science most widely regnant, her highest principles known, her grandest discoveries made.

Science and Religion are both gifts from God. Hand in hand they come among us laden with messages from on high. Each has a part in the salvation of humanity. With them there is no conflict; all is full and perfect harmony. With the advance of Science the anthem of praise from the works of God rises into a chorus infinitely sublime; with the universal spread of religion blessings without number ascend to Jehovah's throne.

The relation of Science to religion is then apparent. Both are the children of Omnipotence, and are given for our guidance. Each in its province is infinitely important. Each strengthens and upholds the other. Religion without science would be feeble and imperfect. Science without religion, the central truth-system of the universe, would be a silly paradox. Then if we would be intelligent Christians we must join the study of Nature to the study of the Bible, and thus may we become "wise in heart and mighty in strength."

MENTAL SEEING AND HEARING.

BY REV. THOS. NIELD.

The editorial reply to our former article is worthy of careful consideration. And it is with profound respect for the opinions of one who has done so much original thinking, and so widely extended the scope of the world's ideas, that we attempt to support our position while availing ourself of some of his thoughts.

What the ego is, and what its organization, is that which the supposed mental seeing and hearing have been cited to prove. It is the proofs that we have challenged rather than the facts intended to be proved. Yet we are not quite prepared to accept as fact all that is claimed. Grant that the ego (the conscious I whose presence is in and manifested through the body) is an entity, and an organized entity, it does not therefore follow that its organism must be an attenuated counterpart of the body. Nor, could we prove that it is such a counterpart, would it be necessary to conclude that, while present in the body, it acts independently of the body, and that all the phenomena of our mental activity—all that seem imaged to our mentality—are veritable entities, parts of a "psychical environment." Neither are we forced to deny the reality of the soul itself in denying that it has a supersensuous existence, in which "the real soul and its real environment are brought together." In other words, to say that the soul exists in and acts only through the body is not to deny the existence of the soul. It may be stated here that we do not disbelieve in the real entity of anything because of its intangibility.

And now let the writer of the reply be equally explicit. He objects that we make seeing with the soul, "in the process of inventing," only memory and imagination." Let him eliminate memory and imagination and then give us the residuum of creative energy that is the essential factor in soul-sight.

The reply claims that the soul has a psychical environment, and that when a chronometer, engine, piano, &c., are imaged before our mentality, these images are psychical, substantial, though intangible, entities. If so, then, whatever is clearly imaged before our mentality must be an entity, a part of psychical environment. But if we can know that some of these images are not entities we have good reason for believing that the remainder are not.

Suppose we look on a Chickering piano, a chronometer, the Great Eastern, a landscape, the sky, an army of men, and then close our eyes. These objects may then be clearly imaged before our mentality; and, according to the theory, when so imaged they are psychical, substantial entities, parts of the soul's environment. From this it follows that each soul creates its own environment—creates a Chickering, a chronometer, a Great Eastern, a landscape, a sky, an army of men, &c. Again, these, being no longer before the physical eyes, are objects of memory. This would compel us to include all the objects of memory as entities in our psychical environment. But what kind of an environment is it when, in panoramic succession, we see last night's sunset, a mid-Atlantic storm, the Rocky mountains, the wreck of a cyclone? Or what kind of entities are they when we view the primeval forest that was cut down twenty years ago, or ourselves in childhood, or a friend long since buried, or hear the notes of an instrument that was long since destroyed? Further, if the product of the inventor's brain be a real psychical entity that his soul sees, hears, touches, then all the products of the imagination are entities. The created personalities of the novelist are entities in his environment. The griffin, centaur, and all the mythological gods of antiquity, were real entities to their inventors. And so must be the absurdities and impossibilities of our dreams, than which nothing at times seems more vividly real. But if the soul sees anything, it sees what it is "conscious" of seeing. As the soul-eyes see the real chronometer, "*even through its case*," so when we see a sunset, a Great Eastern, a landscape, a sky, an army of men, a mid-Atlantic storm, the wreck of a cyclone, the vanished forest, ourselves in childhood, the buried friend, &c., we see the veritable things that we are conscious of seeing. The novelist sees real personal entities of his own creation. He sees them alive. He hears them talk, sees

them eat, as the inventor of an engine sees it in motion under pressure of steam. Surely any theory must break down, under the weight of such absurdities.

While the reply objects to our making "seeing with the soul only memory and imagination," as we have noticed, it virtually concedes the very thing to which it objects. In *The Problem of Human Life*, the writer remarks, page 71; "If our vital and mental being is not an organism, then how does the soul possess eyes with which it sees even more acutely than with the external organs, and can behold every wheel of a complex chronometer, *even through its case.*" In the July *Microcosm* he says: "How did the inventor of the first watch see the wheels, inside the case, running and keeping time before either case or wheels were in existence physically? He saw them just as distinctly before as after the metalic watch was finished," &c. Here, then, he claims for none but the inventor the power to see the chronometer inside the case until, as we said, "the outer eye has seen its works." And then it is claimed that the inventor himself saw the works before the watch was made. Granting this, what more is it than an act of memory when he afterward sees the chronometer "*even through its case?*" Without further argument on this point, find a man who never saw a chronometer and let him describe it as seen through its case with his soul-eyes.

Inventions are the product of the imagination assisted, usually, by the memory. In other words, they are the product of mental activity. And here let the reader refer to our July article. To invent, there has to be a purpose, and great mental effort to attain the purpose. There has to be a genius for invention. One must be a "born mechanic" to invent a complex engine, or a born poet who would write a great epic, or a natural musician who would compose a great oratorio The genius of each depends upon a peculiar quality as well as quantity of brain.

Thus, aptitude for mental work has a physical basis. Besides this, if the inventor would do his best, he must have the best ideals of others, and cultivate his own powers by long and laborious effort, all of which helps to prove that, while in the body, the soul is dependent on the body for the development of its powers and the play of its activities. And even the ghost of Haeckle ought not to scare us from this conclusion. True science is never afraid of a fact because it is in the hands of an opponent.

REMARKS.

We are glad that Bro. Nield has been somewhat explicit, but regret that he has not been more so. He is very concise in his opposition to our view of the "psychical environment" as put forth in the July *Microcosm* in reply to his argument, and thinks it loaded with absurdities, but we honestly believe that every objection he urges is a blow at his own position, namely, that the *ego* is an organized entity within the corporeal structure "the conscious *I* whose presence is in and manifested through the body." Let us look at his difficulties. First, he thinks that, even if this ego is an entity, and this entity an organism, it does not follow that it is "a counterpart of the body." But why object to this *counterpart* as the soul's form? Here is the first indication of weakness. He manifestly fears this "counterpart" since that would give to the soul *eyes* and *ears* here in the body, and what could they be for except to *see* and *hear* with? An organism must evidently have some form. Why, then does he not try to show *how* this psychical, organized entity, the soul, the ego, could be in any other form than that of the body it occupies? Or *why* it should have any other form? He merely throws out the vague hint that it might have some other form,—that of an ox or a sea-lion for all we know,—and thus leaves it an indefinite difficulty as if afraid to express it clearly or give an opinion. We cannot of course prove everything point-blank that we may rationally believe with reference to the intangible, incorporeal realm of Nature, and the conditions of things there; but that is no reason why we should not be out-spoken in giving our philosophical views of the real nature and character of this ego here as well as its prospective condition hereafter. Brother Nield may depend upon it, that although he may find us wrong in many of our conclusions, he will never find us obscure or timorous or faint-hearted in expressing them or in so half-expressing them that we may successfully evade criticism.

Here then we meet the question squarely and risk the consequences. If the soul is an organized entity it must have organs, and this organized entity with its organs must be in the form of the physical body it inhabits, because an *organism* however intangible, must necessarily have some form, and there seems to be no earthly or heavenly reason why our *inner man* should assume any other form than that of the *outer man.* This disposes of the first timid difficulty of our highly esteemed contributor. In the next place, this inner man when it leaves the outer man at death must reasonably be expected to retain its general form as it passes into the spirit-realm, and still continue an organized entity with the same organs it possessed here, namely, eyes, ears, brain, fingers, etc. This unavoidable implies the employment of these organs upon surrounding objects in real acts, such as thinking, seeing, hearing, handling, etc. If the *ego* or the conscious *I* in the spirit-world uses its eyes and ears, it must have an incorporeal or psychical environment consisting of real objects to see and real sounds to hear; for how can the organized ego use its eyes if there are no real psychical objects or incorporeal forms upon which the psychical sight can be exercised? The whole drift of the Scripture is to teach that man in the next life, even now before any general day of resurrection, is *man* in the real sense of the word, with his faculties and powers complete. The transfiguration proves this without any other evidence. To suppose, as some ministers substantially teach, that the soul leaves the body and goes into the spirit-realm an organless, formless lump of psychical substance, without any real objects to see and with no real organs of sight, is a most pitiful and unsatisfactory conception of the future of our conscious ego! If in the spirit-world, after the soul leaves the body, there are no real objects of environment, such as incorporeal houses, trees, flowers, landscapes, books clothing, musical instruments, etc., then heaven will be a poor, blank, desolate region to which no rational being would desire to emigrate. On the contrary, if these incorporeal, psychical entities do really exist there in the soul's environment, they ought to exist here (partially obscured of course by the soul's connection with a physical body), unless the soul is *blind* and *deaf*, as Brother Nield's argument would seem to

imply. But it is here admitted to be an organized entity, and since those organs must manifestly be the counterpart of the organs of the outer man which the ego occupies during this physical existence, it is plain that this organization would be entirely useless in the spirit-world without a psychical environment consisting of real objects corresponding to those of the physical environment here, but improved or degenerated according to the real character and spiritual condition of the different *egos* that are ushered into that more sublimated realm of existence. We most confidently expect when we shuffle off this mortal coil, that we will be greeted with real sights and real sounds from the soul's new environment vastly surpassing in beauty and grandeur, and loveliness anything ever addressed to mortal eyes or ears in this life. Indescribable flower-gardens, lovely landscapes, awfully grand mountain scenery, gorgeous sunsets, with shining lakes, rivers, and oceans, will there be real objects in the soul's new environment, surpassing anything the physical earth affords, and of which the soul-eyes have here caught only faint glimpses in dreams and visions when the physical environment has been momentarily shut out by sleep. Be not startled, dear reader, when we announce our conviction that all dreams are but the *real observations* of the ego into the present surrounding environment of the soul which are momentarily permitted by the slumber of the physical senses. The organs of the soul thus temporarily freed now operate upon the real objects of the incorporeal world which can be but faintly grasped by the poet, the inventor, and the artist in efforts of imagination while awake. Yet even the work of imagination is but a faint view of the entities of the psychical environment which are as real to the soul-organs as the physical objects here are to our corporeal senses. We can imagine or dream nothing that have not a basis in the *real* (distorted many times by our physical relations to earth), and that are not among the possibilities and realities of the spirit-realm of God. No poet or musician ever grasped a rhyme, conceived a rhythm, or dreamt a harmony in music, that did not exist in the mind of God as a reality before the world was, and yet there are ten thousand million new combinations of rhyme, music and rhythm in the mind of that same great fountain of all intellectuality that poets and musicians will never work out till they are clothed upon with their psychical robes, and are in free access to their psychical environment unencumbered by mortal surroundings. God did not make the universe out of *nothing*, but framed it by His word out of the invisible, incorporeal, and intangible substance of the spirit-realm which filled immensity of space before any physical object existed. No insect, flower, tree, mollusk, fish, bird, or mammal ever existed as we now behold it, till it first existed in its perfect form moulded out of that spiritual, pre-primordial substance, by the will and fiat of God. With Him to *think* of an object was to create it, not corporeally, but to form it really and truly in the domain of spiritual existence. These myriad objects only become known to the senses of earthly beings as they are changed by God's fiat into corporeal and tangible substance. But they are none the less real, substantial things while in their immaterial state. The things that are *seen* are temporal (*corporeal*), while the things that are *not seen* are eternal (*incorporeal*); and not until our incorporeal being is changed from earthly to psychical conditions and released from this corporeal tenement will those eternal things be plainly visible to our eyes. Hence every physical form in Nature really exists multifold in the spirit-realm which is and is to be the soul's real environment and of which, as before remarked, the inner man catches faint but distorted glimmers in dreams and by efforts of the imagination. No watch, engine or other device was ever conceived by man that was not already perfected in the mind of God, and which did not already exist as a reality —a fact of creation in the spirit-realm. In this way we can truly believe that "there is nothing new under the Sun." The inventor, in conceiving of a new machine, only grasps with his soul-eyes, in his imagination or his dreams the real wheels, and levers, and springs that already exist incorporeally but perfectly formed in the psychical realm. Brother Nield asks if there is such thing as a real piano in the psychical environment? We answer yes, and every other instrument that man ever constructed or ever will construct, and an infinite variety of others now beyond his limited conception chained as he is to these earthly conditions. When the soul enters upon its real existence, surrounded by its predestined environment and freed from cumbrous clay, it can then play upon a harp of a thousand or ten-thousand strings and draw harmony out of them all at once with greater facility than the most expert musician can now thrum a guitar; for this freed musician can then, if required, by an effort of the will command the aid of ten thousand other fingers besides his own, and at one time sweep the entire range of such a mighty and glorious instrument. If the real soul or ego can thus play upon a golden harp in the spirit-realm, as the Bible teaches and as Brother Nield will hardly venture to deny, may not the soul do the same here to a limited degree, since the same soul in that world can be no more real than the musical instrument upon which it plays, or than the fingers with which those real harp-strings are made to vibrate? It helps nothing against this advanced view of the real soul, with real organs, or the reality of a psychical environment upon which those organs can be exercised, to talk of imagination, memory, dreams, etc., as does our contributor. These are all the acts of the soul here partially cumbered by the physical organism. Occasionally however, a soul breaks away from its corporeal restraints, and like the caged bird, temporarily released, demonstrates its soaring power in poetry, in music, in oratory, in painting, in sculpture, or in some startling invention or discovery in science; but this work, as we have said, is only the appropriation of the realities that already exist in the spirit-realm made ready to be used by the psychical organism whenever it can free itself sufficiently to grasp them. If the soul can thus, while cumbered with flesh, draw out from that great store-house of the spirit-realm such music as we have heard, such paintings and sculpture as we have seen, such poetry as we have read, such oratorical displays as we have witnessed, and such discoveries and inventions as have recently startled the world, what may not be expected of the achievements of this same conscious ego when freed from mortal incumbrance, and when it shall have unobstructed range of heaven's now hidden archives? This view of our ego or selfhood makes the human soul a treasure worth possessing, and its future activity, power, and development in the spirit-realm an achievement worth contemplating. And any effort on the part of any man, whether minister or not, to disparage

or weaken this sublime view of the human soul here, and of its transcendent destiny hereafter by urging and insisting upon such trifling difficulties as those to which we are replying, but helps to strengthen the materialistic tendency of this skeptical age and to impede the onward march of religious truth.

MATTER, MOTION AND FORCE.

BY PROF. I. L. KEPHART, A. M.

The thoughtful observer recognizes the existence of matter, motion and force. They are essential, component parts of the material universe. Matter exists. Its ten thousand forms and ten thousand times ten thousand different manifestations compel us to recognize not only the fact of its existence, but the fact of its ceaseless, diversified motions; and motion, everywhere manifest, compels us to admit the existence of that which produces motion, viz.: *force.*

Matter does not produce force; it only declares the existence of it. The rock, resting on the earth, declares that the earth is being pressed with a *force* equal to the weight of the rock. The iron bar which requires the weight of one hundred tons to break it, declares that force is tenaciously holding its atoms together. Motion is not force, but a manifestation of it—a product of force. A certain amount of force exerted in a certain direction is required to set a train of cars in motion, and exactly that amount of force is required to stop it. The former usually is exerted by steam; the latter, by friction and gravity. But motion is not force, and force is not motion.

The various forms in which we find matter existing and which we observe it assuming are the result of motion; and motion is the result—the product of force. Matter is inert—possessing, inherently, no power if at rest to set itself in motion, nor, if in motion, to bring itself to a state of rest. It simply acts as it is acted upon. And yet matter is constantly in motion—constantly undergoing change—constantly assuming different forms. Organization and decomposition are ever going on. Mammoth structures, spheres, systems, a universe have been constructed, built up, and in the accomplishing of this, matter has for ages been undergoing change; motion has been incessant; force has been exerting itself.

The Nebular hypothesis, of which Darwinism is but an offshoot, accounts for the organization and formation of the universe by the action of certain persistent forces, directed and controlled by a mysterious, all-pervading "law." These forces are recognized as gravitation, heat, magnetism and chemical affinity. By the persistent action of them, through millions of ages, controlled by an omnipresent, ever-acting "law," the universe has been constructed out of "star-dust," and matter has assumed its present forms and activities.

Such, in brief, is the nebular hypothesis. It includes evolution, and was first promulgated by La Place. While it does not pretend to account for the existence of the original "star-dust," or the forces named, nor yet for the existence of the all-pervading, intelligently-acting law, it does account for the existence of the universe in its *present shape.* Granting it the *eternal existence* of matter (star-dust) and the *forces* and the *law* named, and it drives Deity from the universe.

But the eternal existence of these is a question of dispute, and by no means an admitted fact. Some of the most candid and profound scientists of modern times declare that every microscopic atom of matter has upon it the distinct imprint of creation. Its very structure gives unmistakable evidence of its having been *formed.* Reason and observation clearly point to all force as but the product of *thought*—as much so as is the motion of the piston the effect of the expansion of steam.—And these both declare that law is but "a rule of order or conduct *established by authority.*" Burke says it is beneficence acting by rule. The very idea of law carries with it the necessary idea of authority *acting* behind the law. It is but a rule of action, and who ever conceived of a rule executing itself? There is a power, an authority behind the law that *acts.*

On the other hand, investigation, taking up the thread where the nebular hypothesis drops it, traces all the activities of Nature back to a single force. It has discovered that magnetism, in its relations with electricity, produces heat, chemical action, crystalization; and these, which are all so many forms of molecular motion, are but the antecedent or resultant of mechanical motion; and this, in turn, is but the product of force—the creation of an "all-pervading energy." Matter ever moving, force ever acting, carry us, in our researches for their cause, up to the recognition of the existence of an eternal, omnipotent, omnipresent energy; and the fact that this energy acts intelligently, evincing in its products design and forethought, compels us to add to its above-named attributes, that of Omniscience; and the fact that from the activities of Nature we see constantly evolved the greatest possible good to the greatest possible number, we ascribe to it the additional attribute of benevolence or love. Thus we find that it is but a natural, a very easy step from the all-pervading energy of *true* modern science to the Almighty God of Revelation; and that it is a step in harmony with the highest reason and intelligence.

The results then are these,—matter, motion and force exist. Their existence is recognized by all. Materialistic atheism exposes the nebular hypothesis and traces the universe back to where it is compelled to admit and contend for the eternal existence of matter, motion and force, and the still more absurd dogma of the existence of a law without a law-giver. These conclusions being by no means satisfactory to the inquiring mind, true scientific research takes up matter, motion, force and law, demonstrates the absurdity of the theory which teaches the eternity of their existence, and by successive steps that are highly satisfactory to the inquiring mind, because they are truly scientific and philosophical, traces the existence and action of these back to an all-pervading energy, possessing all the attributes of the God of the Bible—the God who upholdeth all things by the word of His power. This conclusion is satisfactory. It gives the mind a resting place. That resting place is in the arms of an infinite, all-wise, righteous, just, merciful, loving Heavenly Father.

THE IMPORTANCE OF MENTAL AND MORAL SCIENCE.

BY G. W. LOWBER, PH. D.

The two fundamental substances in the universe are matter and spirit. No system of science or philosophy can be correct and ignore either of these substances. There are two hypotheses

which deny the reality of a primary distinction between matter and spirit—the material hypothesis which resolves the phenomena of Mind in those of Matter, and the Spiritual hypothesis which resolves the phenomena of Matter into those of Mind.

We sometimes hear persons speak of the grossness of matter, as if there was something wrong in matter itself, and something in it opposed to spirit. This is a great mistake; for Christianity provides for the future welfare of the body, as well as that of the spirit. The incorruptible body will contain material; for if not, it could not be identical with the one sown. Matter in its ultimate forms, is incorruptible and incapable of annihilation. Oxygen, nitrogen, and hydrogen, are simple forms of matter; and as such, are pure and incorruptible. The spiritual body will completely unite and harmonize matter and spirit. It will be entirely under the control of spirit; but, at the same time, it will contain enough matter to identify it with the material body which was sown.

Those who deny the existence of spirit, stand absolutely opposed to the intuitions of universal Intelligence. There is as much reality in thought, feeling and voluntary motion, as there is in solidity, extension, and impenetrability. It is claimed that we do not understand the essence of mind. I answer, we understand it fully as well as we do the essence of matter. All that can be known about matter, must be known through mind. If persons are more familiar with matter than they are with mind, it is because they have given more attention to the gross than to the refined, to the sensible than to the supersensible. Among the most vital errors of education, is the giving of almost exclusive attention to the physical man. To avoid this, the study of mind should be introduced into the schools at a much earlier age than is usually done. In this way much of the tendency to materialistic views would be overcome. The study of the mind is commonly regarded as very difficult more on account of unfamiliarity with the subject than of any thing inherent in it.

The apostle John who is sometimes called the philosophic disciple, says that Jesus did not need that any should testify of man; for he knew what was in man. If the Great Teacher knew what was in man, it is evident that Christian teachers, at the present time, should have some of the same kind of knowledge. That can be accomplished now by the careful study of mind in the light of God's Word. Other things being equal, the more knowledge a man can possess of this kind, the greater will be his influence. It will be claimed that we need practical tact in managing men, and that this can only be acquired by experience. There is truth in this statement; yet there are many who study the wrong side of human nature, and acquire a certain tact that brings ruin upon themselves. They become sharpers, and call all others impractical. While men differ, human nature is very much the same after all; and I am convinced that the people generally prefer an honest and a conscientious man to one who is a sharper, and who is governed by policy. A man should be just and honest because it is right, and not because it is simply the best policy. A theoretical knowledge of the mind, will always be found valuable in the practical study of man.

There is something wonderful in the adaptation of Christianity to the mind of man. As there are no two persons alike in body, so there are no two alike in mind; yet the Christian religion is adapted to every mind, and it will lead in the right way all who will accept its guidance. It is our duty to study self carefully. The Bible teaches the importance of knowing self. The study of others is also important, when it is done for their good; but if it is done with the spirit of the cynic, it can only result in evil. The Bible should be our guide-book in every department of study, as well as in every department of life.

LANCASTER, KY.

MENTAL FORCE THE SOURCE OF ALL ACTIVITY.

BY ISAAC HOFFER.

The forces of Nature are only agencies without any powers of causation or control over their actions.

The first evidence of their existence is motion, and the different results of their actions are only evidence of various kinds of motion; or motion variously controlled. And although motion propagates motion it is primarily only an effect, a something that proceeds from an impulse, an effect of a cause outside of itself.

Neither matter nor the forces of Nature, separately or united, have in themselves powers of causation. They move and act, and motion and action proceed from their movements and actions, according to fixed laws, and subject to special requirements and special conditions wholly without their power to bring about, or to change, or control. They are like a machine with its movements fixed, its powers applied and its actions producing and reproducing the same results. The efficient cause, the moving, directing and controlling energy, of all the activities in animate Nature, and of all the operations in inanimate matter, is therefore not found in force and matter, and must be looked for somewhere else. These activities and their results afford no indication as to what their designing, originating and exerting energy is, nor how it is exerted and transformed into visible manifestations. We are therefore compelled to resort to comparison and analogy in order to get even an idea of how an invisible and unsearchable energy can be exerted and transformed into manifest mechanical actions.

Mind, that unseen and unsearchable power, is the only known energy that, like the unknown Cause of Nature's activities, has originating, designing and exerting powers, with capabilities of transforming its operations into visible mechanical actions. The transformation of mental force in man, namely, consciousness, thought and knowledge, into visible mechanical action is a well-known fact. Almost every motion of the body and all works of the hands are mechanical actions in which the physical powers employed are mere agencies exerted, directed and controlled by mind. The operations of mental force are not even manifest until transformed into such actions. The design of a mechanic for the construction of a building, ready to be put into execution, is an unknown and unknowable thing to outsiders until manifested into mechanical action. The physical powers of man seem to be self-operating just as the forces of Nature seem to be, but we know that in the former the moving, directing and controlling power is mind, and it is a rational conclusion that there must be a similar power in the latter; because the manner and effect of their actions are alike, and because there is no other known power except mental energy that

can move, direct, and control physical or any other forces. Mere animal energy, without the power of bringing it into manifest action, would be nothing, and this energy, exerted without a directing and controlling power, without design or object, would accomplish nothing.

Mind, therefore, seems to be a typical representative of the efficient Cause, the unseen Energy and active Power from which proceed persistent motion and all the activities manifested in Nature. If we assume that mental force is the cause of these activities, and that the manifesting powers are mere agents of this force, the mysteries and all phenomena of Nature, are greatly simplified, and the order of Nature's manifestations appears to be consistent and rational.

When we look at the results of Nature's activities—look at the plant or animal, and ask ourselves, How could they be originated, developed and perfected? If we answer by "chance," the consistent order and universal system in Nature contradict us. If we answer by the "potency of matter" and "mechanical necessity," we call an active power a manifesting tendency and acknowledge a cause which is not matter, and thus admit a purpose in attempting to deny it. For there can be no necessity if there is no purpose or object to be accomplished. If we answer that mind conceived the initial purpose of building the plant or animal, conceived the design or plan, comprehended the requirements both as to the power to do the building and the particular material needed, and has employed the means which knowledge indicated would accomplish the purpose, we have explained a reasonable and consistent way by which a plant or animal could be built. It fills us with admiration and astonishment when we look upon the developed plants and animals and contemplate the unseen Power that could bring into action agencies to produce out of dead matter such results.

(To be Concluded next Number.)

THE LIFE UNENDING.

BY PROF. JOSEPH SALYARDS, A. M.

I had more than one reason to rejoice, the other day, on meeting my friend Herman once again. Blessed with unvarying cheerfulness, natural kindness of disposition, and general intelligence, Herman appears to move in an atmosphere of his own. By daily recourse to the writings of his eminent countrymen—Herder, Cramer, Heine, and Novalis—sometimes of Plato and the Neo-Platonists,—he maintains the original brightness of his convictions and reverent intentions, which we all experience in our early years under the revelations of Nature.

I had been too long indulging a train of philosophic reflection on the possibilities of a future life in man, or the separate existence of the human soul, and I had imperceptibly descended from painful apprehension to a cloudy region of dismay, and then almost to the verge of hopeless despair. Herman soon noticed the gloom that hung around me, and in his obliging way, desired to learn the cause of my depression. "Really, my dear friend," I replied, "the nearer we approach our end, the fainter becomes the hope of our continued existence. When I reflect upon the Nature of life itself,—the intimate connection of the conscious soul with that life;—when I analyze the structure in which that life is found here, and examine the whole question honestly and impartially, it is impossible for me to conceive how that life and that soul can continue to exist after the dissolution of the material organism in which they have exercised a temporary control. Without life, surely there could be no consciousness, no soul,—and life I take to be nothing but the integration, or resultant of quite a complex system of co-ordinate activities. Now, let these activities all come to rest; let the air cease to inflate the lungs, the heart cease to throb, the pulse cease to beat, the blood to circulate, and the entire frame lie motionless and dead with the coldness and pallor of decomposition enshrouding the whole; where then will this life, this consciousness have gone? My friend, I cannot answer the question."

"Our conceptions," said Herman with great deliberation and modesty, "are often misrepresented, sometimes misdirected by our limited vocabulary. Our philosophy anticipates our experience; experience often disappoints our philosophy; our imagination outstrips our reason, and reason, herself often sports on the wings of imagination. Confined as we are to the domain of sense, we confound the sensible with the intelligible and the contrary. We apply terms belonging to the finite only, to the infinite, though observations must have taught us that we live amidst two kinds of substances, the material and the immaterial; the one, space-filling, the other, time-enduring, but having no relation to space; the one perceptible to sense, the other void of all dimensions, intelligible only to the mind; yet we continually misapply the terms distinguishable and appropriate to each. Because *we* sometimes foreknow and predict, we say the Supreme Being who inhabits Eternity, *fore*knows and *pre*destinates. We confound subject and attribute, actor and activity, the power and the potency, the agent and the agency. We see an old mansion fallen into ruins, and we say the inhabitants are all dead; and refuse to see the new and more splendid mansion on yonder hill.

"One defines life to be 'a co-ordination of actions': not a thing which co-ordinates. Of course, when the structure falls to pieces, the co-ordination exists no longer. Another says that 'Life is a series of definite and successive changes, both in structure and composition, which takes place in the individual without destroying its identity.' Here again we have nothing but a series of changes, not *anything* which causes the changes. Consequently, when the changes cease, life ceases. Now I can surely see that life is the principle, force, or cause, which, for a limited time, maintains this system of changes, and when the principle is withdrawn, the series ceases, and the structure falls to pieces.

"I understand that this principle of life manifests itself in different degrees or modifications. There is a vegetable life; there is an animal life, with the attributes of sensation and volition superadded; there is a human life with the additional attribute of soul, mind, or spirit,—either of which terms will answer our purpose. The physical organism of man, like that of the animal creation, is sustained by perishable food; hence, it continually wastes, and, for a limited time, is renewed and reconstructed, until the perishable nutriment will sustain it no longer. Material food assimilates with the body, and is converted into blood, flesh, bone, sinew; so truths assimilate with the soul, supplied with imperishable food such as truth, justice, right, law, virtue,—entities which are essentially eternal. It becomes immortal, because it has assimilated immortal food and

has become, identical with the aliment which sustained it in the midst of infinite relations—boundless space, endless duration, eternal destruction of right and wrong, the contemplation of which constituted its sole prerogative. How would it be possible for it to die, constituted as it now is of eternal virtues? The body, with which it was connected must die, being constituted of perishable elements, but every truth which entered the soul is true now, and will be true forever, and this truth will be assimilated with the soul; the soul was made an attribute of the life and therefore the life has become immortal. Ask you what becomes of it? whither it goes and 'leaves its darkness dust behind?' where does all truth reside? In the Mind of Deity, ever preserving its individual identity, and the soul in a spiritual body preserving its own conscious identity, in a golden cloud or in a sunbeam. Bodies need not always be made of clay. The *liberated* soul will dwell in truth, and truth will dwell in God."

"I am ready to grant," I said, "that this is one mode of demonstrating a universal truth. Doubtless there are many others; for if it is a truth, it must necessarily admit of demonstration. The argument you have stated avoids admitting the immortality of animals, for no animal lower than man can conceive those principles which make the soul immortal."

AN OLD QUESTION WITH NEW EMPHASIS.

BY COL. JOHN M. PATTON.

What is *science?* There is science and science—but what *is* it? The word itself is almost pure Latin—*sciens*—and is transferred from that language to ours, with the change of only two letters. It means simply *knowing* in the Latin, and in our language we mean by it the thing *known*. An attempt to discover anything, therefore, in order that we may *know* it thenceforth, is a scientific investigation. The little prattler toddling by his father's side, and stopping to wonder at and examine each tiny insect, stone or other novelty, is trying to find out something new to him, and in his little way is studying science or making a scientific investigation. So with the maturer school-boy in his toilsome tasks in botany, chemistry, or other studies. Now be it observed that the mere observation of known and existing facts is only the *first step* in science. The second step is the discovery of *new* facts; and to this second department of science belong all the investigations of the chemist, the geologist, the astronomer, or other scientist, whose ambition is to discover some new substance, some new combination of matter; some new comet, or planet, or sun, or nebula. Important as is this work, and admirable as may be the patience, perseverance, and penetration necessary to its accomplishment, the successful scientist whose field it is, has only placed his foot on the lowest round but one of the majestic ladder of science, which though resting upon the depths of earth reaches up more sublimely than Jacob's ladder to that first battlement of the infinite knowledge, on which the true seer may plant his feet, and hold converse with the angels on their own vantage ground, instead of waiting for their descent to him. The scientist who discovers new facts in his department is worthy of great honor, and justly receives it, but at last he is the mere tool maker, the mere accumulator of material, which other and higher scientists must use for the real business in hand.

To these higher scientists belong loftier rounds of this grand ladder of science. To attain to these the facts of science as ascertained by the more humble toilers in the laboratories of Nature, must be viewed from on high by eagle eyes, moulded in mighty brains, and combined into new species of science.

We may say then, that science is a generic term, embracing all that is known by the learned among mankind. It has its species—Theology, Law, Medicine, Mathematics, Biology, Anthropology, Astronomy, Geology, Chemistry, Meteorology, etc. Each species has its departments, all well defined. But in a larger sense we may say that each has three departments—those presided over by the eye to see, the hand to manipulate and experiment, and the regal mind that matures and appropriates the facts, and then draws the just conclusions from them. In this broad division we may say that the naturalist who observes, the chemist, the microscopist, etc., who analyze, and the great *thinker* (the greatest of the three classes) who combines the whole into the species of *science* to which the results belong, are the representatives of that particular species of science.

Let us illustrate. One illustration will be sufficient, though we might choose from hundreds of them.

The late Commodore M. F. Maury may, more justly than any one else, not excepting the late Dr. Heinrich Wilhelm Dove, of the Berlin University, be called the founder of the science of meteorology. His was the grand intellect—grand in its very modesty alone—that utilized the seeing eyes, and the recording hands of thousands throughout the world, in his wonderful generalizations. He had the glory not only of suggesting the experiments to be made, but of seeing in advance both the process and the result. The nice subject he explored required a world-wide observation, of which he, as an individual, was incapable; and there were, doubtless, many distinguished observers among those he directed who (though only on the second round of the ladder like certain chemists and other scientists) were far superior to himself *as observers;* but there was not one of them who could have taken his place in reducing to order, and chaining to his winged chariots the subtle winds and waves. What was the result?—the new department in science, meteorology—and by it, the marking of the pathless ocean with highways; and the saving to the commerce of the world of hundreds of millions of dollars *per annum.* (I pause here to ask if it is not strange that commerce has not built to him a grateful memorial column, worthy of her wealth, but not capable of being worthy, however built, of his services?)

But neither Maury, nor Copernicus, nor Newton, nor any of the great thinkers and workers of the world, have ever reached, as scientists, the *topmost* round of the immortal ladder of science. We may well ask: "If these have not attained it, who has?"

This article hopes to answer that question.

We have seen that there are various classes of scientists—all in pursuit of the knowable—who are on different rounds of the ladder. But who is on the *topmost* round? There *is* a topmost round—may be far, far beyond man's possibilities—but it is somewhere.

Who can attain to it?

We have ranked among the sciences—*theology.*

But is theology a science? In other words can we *know* anything about it? Science is what is known or knowable. If theology be not known or knowable, it is no science, but a dream, a ghostly fancy, a fairy tale. If we might invoke authority we could call on "the judicious Hooker," who pronounces it the "*Mistress* of the Sciences;" but the agnostics will not let us rely on authority; so we must come to proof. Now if there be anything known or knowable about theology we may claim that it is a science—even the "*mistress of the sciences.*"

How then is anything to be known? It may be known 1st, by intuitive perception—2d, by testimony or history—3d, by experiment. One of these three modes must always be employed, and either is sufficient. If all concur our conclusion is inevitable.

Theology relates to GOD, His existence, His purpose present and prospective, His agencies—His manifestations of Himself, *in His works* and *otherwise.*

The subject is immense—even infinite—it cannot be adequately treated at all—much less in a column article. I only attempt therefore to point out the heads of it. What does intuition say of it? The heathen, the child, the uncorrupted man—*all*—intuitively accept a God. A man—even a corrupted man—may blaspheme and deny a God while standing in security at the top of a well. If he falls in—he will be praying to Him before he gets to the bottom. I appeal to universal experience, in shipwrecks, in earthquakes, in tornadoes, in *any* extremity. The universal instinct and intuition testifies of *God.* Even the intellect perverted by "science falsely so-called" still cannot get away from God and religion. Prof. Tyndall says, "Religious feeling is as much a *verity*, as any other part of human consciousness, and against it, on its objective side (which ever side that may be) the waves of science beat in vain." He does not seem to recognize it as science however—though it is a purer and loftier science than his own. The great Darwin could not get rid, intuitively or logically, of God, but considered it a "sublime thought that He breathed the breath of life originally into a few forms or one." Intuition then accepts a God and *knows* of Him. That which is *intuitive* in the race is infallible, but there is no space here to prove it.

What does testimony or history say of it? A distinguished professor of history in the University of Virginia, has said that all secular history before Him pointed to Christ, as God manifest in the flesh, and all secular history after Him, points back to Him. If this be the testimony of secular history, it only conforms to Sacred history as the shadow to the substance. At least all history recognizes a God, and as a consequence a theology, or something that is *known* of Him. A discussion of it would require a big octavo.

What does experiment say? First I appeal to the works of creation and then I appeal to universal biography—to the lives of Augustine, of Luther, of Newton, of Johnston, of Brewster, of Maury, and of many tens of thousands, as wise, as experimental, as little capable of self-deception, as Haeckel, as Tyndall, as Huxley, or as any other atheist or agonstic for proof that they have *tried* and *proved* theology to be the truest, the loftiest, and the most blessed of all the sciences.

I claim then—in spite of the fact that theologians (many of them) mis-call God, caricature Him, and drive men from Him by their rigid and absurd definitions of Him—that God exists, and is knowable, and that with Him exists theology, the grandest, and purest, and most certain of the sciences, nay "*the mistress of the sciences.*"

Let us not be discouraged then, even though Haeckel, and Tyndall, and Huxley, and the rest of them, leave their little subordinate spheres, and (like the people of Bunyan's "Vanity Fair" in their ignorance and folly) throw dirt on the spotless robes of a true theology—the very embodiment of all true science, if it be a science at all, since it treats of God, the fountain, source, and Author of *all* knowledge.

Let us thank God that He has manifested Himself in the flesh, in Jesus Christ our Lord, who standing on the topmost round of Divine and human knowledge—has made plain to us a system which comprehends all science and combines all that is known, into the true, the good the beautiful, and the sublime—the *kalokarathor* of Plato and the moralists, to which they aspired, and which they worshipped from afar.

THE EDIFICE WE OCCUPY.

BY REV. T. WILLISTON.

(*Concluded from last month.*)

In the necessity man is under of tasking all his energies, physical and mental, and of maintaining himself by some kind of labor, the wisdom of the great Disposer is very discernible. He that could speak such a world as ours into being, and create a human tenant to occupy it, *could* have supplied all the necessities of that tenant without obliging him to rely on himself in the least. He could, without their cooperation, have provided men with food, and apparel, and habitations; with everything, in short, that necessity or convenience might demand. But what would man have been good for, had he been exempted from all necessity for toil, and invention, and self-dependence? As things are, he has to find things out by study and reflection; his inventive powers are tasked, his dormant energies are called into frequent and vigorous action, and thus the man is gradually developed until, from being a dwarf, he gets to be a self-made giant. And then what an evident anticipation there was of man's necessities, in his being provided with such beasts to aid him as the horse, the ox, the ass, the mule, the camel, and the reindeer. How came the size of these beasts to be so well-proportioned to the statue of him for whom they were to toil? How happened it that the horse, for instance, instead of having a height convenient for the vaulting rider, was not so tall, when full-grown, as to render a ladder necessary in order to get upon his back? Was it Chance that gave the camel that *unique, peculiar foot* which, for an animal that was to traverse immense wastes of hot sand and carry immense burdens, was seemingly so necessary? And those *internal cisterns* where this animal can, before starting across an unwatered desert, store away a large supply of water, and from which it can transfer water to its thirsty stomach—did Chance give the creature those thirst-quenching cisterns?

Think, once more, what ample provision has been made for gratifying man's *inborn love of variety.* That craving is consulted in the numberless edibles that are provided for his sustenance; in the several sorts of material suitable for apparel; and in the many dissimilar fabrics made from them; in the greatly diversified natural scenery that meets man's eye; and in the various kinds of

employment that there are to pursue. And has not man's *love of the beautiful and the sublime* been consulted by the world's Contriver, no less than his love of variety? What, then, mean these velvet walks and lawns, these fields of waving grass and grain, these loaded and fragrant orchards, these charming groves and solemn forests, these fountains, babbling brooks, and noble rivers, these cascades and cataracts, these fat valleys and grand old mountains, this heaving ocean dotted here and there with sails, and this overhanging vault studded all over, at night, with glittering worlds! O man, art thou so brutish as not to discern, in all this lavish display of the lovely and the grand, the inexhaustibleness and glory of Him who constructed this abode of thine? Marred though it be by sin, is not this home of thine a spot that God has been at pains to adorn and make attractive? Where is he whose sense of the beautiful has not a thousand times been regaled with Nature's unwritten music? Where the man whose soul has not swelled with sublime emotions, as he has climbed some towering summit and gazed around? Is there one that has not been filled with solemn yet silent awe, as from some commanding eminence he has looked out upon the ocean stretching interminably away, emblem at once of life's instability and of man's boundless hereafter? O how obvious it is, that as man loves to blend the beautiful with the useful in what he constructs, so does and so has the Framer of all things, in the stupendous fabric of the universe. And if the skill and forethought evinced in the structure of a house prove that it had a human contriver, what shall we say of this vast edifice, the Earth, with all its rich garniture and magnificent surroundings? Bears it not the impress of a Planner whose "understanding is infinite," a Builder to whose power and skill there is no limit? Reader, before Him let us kneel and with an ancient poet exclaim, "O Lord, how manifold are thy works! In wisdom hast thou made them all." Yes, "great and marvelous are Thy works, Lord God Almighty." To which ascription let us adoringly add, "Just and true are Thy ways, Thou King of saints."

SCIENCE AND INSPIRATION.

BY REV. E. H. VAUGHN, D. D., PH. D.

The "Testimony of the Ages," has suggested the following thoughts, in reference to the harmony between Science and Revelation, and which *alone*, are sufficient evidence of Biblical Inspiration.

The Bible is true, alike, to the highest records of human history, the highest facts of human science, the highest instincts of human nature, and the highest aspirations of the human heart. It is the medium through which a voice from heaven speaks to us, in a dialect that can be understood by an accusing conscience, acknowledged by a sovereign will, and negotiated by a living faith.

Its jurisprudence underlies all true civilization and its decalogue, though a thousand years older than Plato and Pericles, is yet the corner stone of all true government. And science is now just beginning to lisp in whispered accents, some truths that IT uttered in thunder four thousand years ago.

The facts, both in history and in science, agree in every instance, with the truths of revelation, thus proving that the ancient saints who penned its words must have received their knowledge through Inspiration, and from Him who knoweth all things from the beginning.

Modern Philologists agree in dividing all the languages of earth into three distinct groups, which they have designated as the Aryan, Turanian and the Shemitic, and the Bible says, that the descendants of Shem, Ham and Japhet were divided according to their families, and according to their tongues, in their countries and in their nations, while a comparison between all the tongues of earth bear witness to the truth of this statement.

Medical science, has, in modern times turned its attention to the blood, and has discovered that when sickness comes, the remedy must reach the blood, in order to restore healthfulness to the body.

It has also been demonstrated that when the blood of a young animal is injected into the veins of an old one, it restores the vigor of youth so long as it lasts, but the Bible announced long ago that the life of the flesh is in the blood.

The human race was growing hoary with age, and many civilizations had arisen and fallen, before the circulation of the blood was discovered, yet two hundred and fifty years before the birth of Homer or Hesiod, Solomon had said: Or ever the silver cord be loosed, or the golden bowl be broken, or the pitcher be broken at the fountain, or the wheel be broken at the cistern.

These discoveries of science are no more than the windows in our Father's house, which occasionly open to our view the treasures of inspired wisdom.

It was only as yesterday that a devotee of science discovered the fact that the air can be weighed, and that water is compounded of gases, and combined by weight and measure, but it was four thousand years ago that the old Patriarch of Idumea said of God: He looketh to the ends of the earth, and seeth under the whole heavens to make the weight of the winds, and he weigheth the waters by measure.

Modern Chemists can not read these words without wonder and amazement for they embrace the sum total of scientific information on this point at the present day.

If a man is ignorant of scientific knowledge he will show his ignorance by his questions relative to it, and a man must be well informed in the principles of any given science before he can ask the difficult questions belonging to it.

Let us see then, some of the questions in the inspired word, as recorded by Job:

Where wast thou when I laid the foundation of the earth? Whereupon are the foundations thereof fastened, or who hath laid the corner-stone thereof?

These questions, though asked four thousand years ago, cannot be answered by men of to-day.

It was said of God in the days of old, that to the ocean he set bars and doors, and said to it thus far shalt thou come and no further, and here shalt thy proud waves be staid. But it is one of the recent discoveries of modern science that the ocean is shut in by an exact adjustment of the forces of gravity, the earth's velocity, the weight of the atmosphere, and the influence of the moon's attraction.

The moon has been approaching the earth for ages, but astronomers have recently discovered that its orbit swings from an ellipse to a circle, and then by the slow march of countless ages back to an ellipse. It has a law and a limit; and this is one of the bars that hold the ocean in bounds:

Hast thou commanded the morning since thy days and caused the day spring from on high to know his place?

This means that the sun always knows his place, and the time of his coming; that he is never belated, and never in a hurry, and six thousand years of history have proved it true.

The earth also revolves according to a fixed time and order, and by its centrifugal force piles up the ocean at the equator until it is far above its level at the poles. Should this motion cease, the water would sweep over the continents and deluge the world, and this is why the inspired one said: To the ocean he has set bars and doors, and compassed the waters till the day and the night shall come to an end.

Hast thou perceived the breadth of the earth? That is, the distance from pole to pole, and no man knoweth it, even to this day. These questions are all filled with truths of modern science, and yet they were written long before science had an existence, and argue that these ancient saints were inspired by the Author of Nature.

There is also a beautiful accord between Geology, and the Bible. One account says: In the beginning God created the heavens and the earth, and the other says: That the beginning was so remote that the mind cannot travel back to it.

One account says, that after many ages of productive energy the Creator ceased from his labors, and the other says: He rested on the seventh day.

One affirms that there was an order, and a successive series of steps in the work of creation, and the other tells what that order and these steps were.

One says that light was countless ages in gathering into globules and orbs, and the other says: God appointed the sun and moon to rule the day and the night: and this was on the fourth day, long after the creation of light.

One teaches that a gradual cooling off formed the crust of the earth, and that inward heat threw up the mountain ranges, and the other says the dry land appeared. One affirms that the sea was filled with animals of a low order, and the other says: Let the waters bring forth abundantly.

One speaks of man as the last of the Creator's works, and the other affirms that the work was consummated in him. These parallels, and coincidences are beyond human explanation, and argue that God is the Author of the one and the other.

Science comes at last to verify the truth of Revelation, to condemn the skeptic, and encourage the Christian.

The currents of rain, and the principles of evaporation have been made known by modern science, but it was long before the birth of science that Solomon said: All the rivers run into the sea, and yet the sea is not full. Unto the place from whence the rivers come, thither they return again. And to this day the most improved science cannot better the statement.

Recent discoveries of physical Geography affirm that currents of air continually travel to and fro between the equator and the pole, and that they are continually whirling round and never rest.

But it was three thousand years ago when Solomon said. The wind goeth toward the South and returneth toward the North. It whirleth about continually and returneth again according to his circuit.

Job evinces a knowledge of Mineralogy when he says: There is a vein for the silver and a place for gold where they find it. Iron is taken out of the earth, and brass is molten out of stones. And again he says: Under the earth is turned up as it were, fire. He speaks also of the circular form of the earth, when he says of God He sitteth upon the circle of the earth. Again he says of God: He stretcheth out the North over the empty place, and hangeth the earth on nothing.

Since the sciences were then unborn it follows that Job must have obtained his information from God alone.

Joshua commanded the light of the sun and the moon to stand still, that he might have time to beat back his enemies: but at that time and for many ages afterwards no one else knew that these bodies were in any way connected together in themselves, or with the earth.

It has long been known that the Solar system is in motion, but of late some Astronomers have affirmed that it circles round one of the stars in the Pleiades. If this be true, it gives new meaning to the words of the inspired writer, when he said: Canst thou bind the sweet influence of the Pleiades?

Science informs us that the moon has cooled off, that earth is cooling, and that the sun also is by the same process losing its vitality. Slowly indeed, but speed is as nothing when Eternity is yet to come.

Science and Revelation are only two volumes of the same book which was written by our Father, and reveals to us the extent of His dominions and the hiding of his power.

IS MATTER ETERNAL?

BY REV. J. J. SMITH, D. D.

This question the ancient Grecian philosophers answered in the affirmative. Epicurus, the leading advocate of this theory in that age, taught that innumerable solid atoms had always existed in infinite space; that they were of different sizes, and forms, and that they were all separated from each other; and that they were originally at rest, or motionless; but that there was in them a *tendency* to motion. When reminded that if they had not moved eternally, that they could never have moved at all, to escape this dilemma he replied, they had moved eternally, but in *parallel directions*. When it was objected, that with such a motion they would never have approached any nearer to each other, he shifted his ground by having them to move in a small degree obliquely. The general direction of this motion, he held, was downward; and was the result of their own weight, not understanding that where there is no attracting body, there is no weight.

Now that these heathens of that age, should have involved themselves in such an entangled mass of absurdities, as they groped their way amid darkness only by the aid of the dim light of reason, is not particularly a matter of wonder. But that any physicist of this day should go back to this old heathen hypothesis that was founded in ignorance, in order to get rid of the idea of creation, is certainly a matter of astonishment, and its solution can only be found in the deep seated enmity of the unregenerated heart toward God.

As an evidence of this, *viz.*: that this hypothesis is founded in hostility to the Mosaic account of Creation, and not in reason, let us briefly glance at some of the difficulties of this theory. Its

advocates claim that atoms in the form of exceedingly rarefied gas existed in space; and that out of this eternal void and formless substance, away back in primordial ages, the entire physical Universe has been evolved and ultimately brought into its present condition, together with all the marvelous forms of vegetable and animal life. Now, it is manifest, that these atoms must either have extended throughout infinite space, or else they were limited in extent. If the former is assumed, then it is plain that there could be no *center* or *centers* of attraction. In this case all the atoms would be *equally* drawn in all directions; consequently no motion whatever could possibly occur without some external or outside force. The theory therefore breaks down.

If however it is claimed that these gas atoms were limited to a certain field or fields of space, the difficulty still exists as to how they were first set in motion. Surely no motion could result from attraction, because the tendency of gases is universally to expansion. When the limit of expansion is reached, so that expansion and attraction balance each other, the only possible result must be rest, for the law of *inertia* is that no atom can move itself.

Besides, if matter has existed from all eternity, all of its properties and operations must have been eternal also. Hence it must have operated from eternity in every way in which it is possible for it to operate at all. Whatever changes and forms of life matter has produced, as claimed by these evolutionists, must have been produced eternally. It therefore inevitably follows that there must have been an eternal series of Man, of Animals, of Vegetables, etc. This, however, would involve us in difficulties and absurdities from which there is no escape. For instance, as there would be in this case an infinite number of human beings, and as each one has two hands, the number of their hands would be double an infinite number; and the number of their fingers would be ten-fold greater than the infinite number of men!

Again, in such a series the first man only would be an infinite distance from the present. The next, his son, perhaps 30 years younger, would be either at an infinite distance from us, or at a finite distance. If the former, then we have two finite distances, one of which is 30 years shorter than the other, which is manifestly absurd. If, however, it be affirmed that the son would be at a *finite* distance from us, then it inevitably follows that 30 years added to a certain finite number would make *that number infinite*, which is equally absurd. Yet the eternity of matter (without a Creator) plainly involves the doctrine of the eternity of man as taught by Ocellus Sucanus and others.

But this is not all, this assumption of the eternity of matter is attended with other insuperable difficulties. If matter be eternal it must be in the nature of things uncaused, self-sufficient, independent, and unchangeable. For what is uncaused, and independent, is necessarily always the same. But what are the facts in the case? We see all forms of matter around us continually changing. It is therefore evident that matter cannot be eternal. We know that every succession of new form of matter is made up of parts each of which has a beginning. Hence it is plain that the whole has had a beginning. Besides, where is the consistency of assigning to matter the attributes of eternity, self-existence, independence, etc., and rejecting a Creator under the plea that they cannot conceive of such a Being, when the Mosaic account of Creation solves the whole difficulty?

PROF. GOREE AGAIN.

The reader will remember that we copied into the July *Microcosm*, a letter of Prof. Goree's which appeared in the *University Monthly* of Tuscaloosa, Ala., in which he came out with the squarest kind of indorsement of the new departure on the sound theory, as maintained in the *Problem of Human Life*. Prof. Goree now writes us as follows:—

"I have read the July number of the *Microcosm* with great interest, and am delighted with the prospect of the change to magazine form. I cannot cease to feel the profoundest interest in your work, and to be amazed that any one who reads your arguments against the wave-theory of sound should still be able to teach the old theory. We were excusable for believing in it when we had nothing else to believe, but there is now no excuse for any one who has access to your works. The old theory is not only a fallacy, but, as you have proved over and over, a stupendous one. It is not one of those errors which approximate the truth, but one of those blunders, like the geocentric theory of astronomy which, having in its favor certain appearances, is yet almost infinitely removed from the truth. And to think that any educated person, especially one who has studied physics, can believe in the old theory after its absurdities have been pointed out, is a matter of amazement. I confess I cannot understand such a state of things. With very many wishes for your health and continued success, I remain, sincerely your friend, J. A. Goree."

VITAL AND MENTAL ORGANISM.

A. Wilford Hall:

I have just finished reading the *Problem of Human Life*, and am prepared to say that I have been instructed as I never was before. I might go on with pages of encomium; but it would only be a repetition of what has already been said. Now, dear sir, my only difficulty is in comprehending your views of the transmissions of parental qualities through the internal vital and mental organism. I say I find it difficult to unstand, because I cannot form a conception of *how* a parent can transmit consumptive habit, for instance, to the offspring; and yet I cannot adopt the old senseless theory of transmissions by *physical* transmutation, inasmuch as our bodies are undergoing constant mutation and displacement. But right here is where the trouble appears, with me. We take for instance the operation of inoculation for small-pox. We can discern in that operation the destroying of that particular element (whatever it may be), which is ever present in the blood when not destroyed by inoculation or by small-pox. Now the question naturally arises why is it not necessary to re-inoculate after a sufficient time has elapsed to supplant the atoms, etc., which were present at the time of inoculation? But such operation is not necessary even though we live to be old. However, I can but admit that it will eventually deteriorate more or less. We also see individuals who were tattooed, or marked in some way with indelible ink. Again I am puzzled to know why these marks, etc., remain unaltered while such

renovation and substitution are constantly going on in the body. The same query suggests itself in regard to birth-marks. Will you kindly give an answer to the aforesaid queries which naturally suggest themselves to an inquiring mind, when thinking upon the question of hereditary transmission? By so doing you will do me, and not only myself, but others, a special favor in clearing up the apparent obscurity. Your friend,

W. J. DEEMS.

ANSWER.

Because facts and processes in Nature are mysterious and even inexplicable is not sufficient reason for ignoring them or doubting their existence. We do not deny that it is impossible to explain the *modus operandi* of the connection of the vital and mental organism with the physical structure, or to tell in what manner the father and mother transmit their mental and vital traits to their children. Yet we know it is done, and we are sure it is not done through the physical organism. A father may have lost both arms by accident, even when a child, yet his offspring are not armless on that account. It is the vital and mental organism, only, that gives the form of the physical as well as the character of the vital and mental being. How this transmission takes place mortals do not yet understand. They know, for example, that an invisible, intangible substance passes from the poles of a steel magnet, through plates of glass and siezes a bar of inert iron causing it to move bodily. Yet what magnetic substance is, or how its molecules take hold of those of the distant iron, or on what principle the magnetic corpuscles let go of the magnet, travel through space, penetrate and pass through the most impervious bodies in Nature as if nothing intervened, are mysteries the mind fails to solve or even to imagine for them a solution. We do not therefore doubt the existence of such a substance, nor ignore the fact of its operating as described because we do not understand the process. The fact that the sight of a monstrosity by a mother will impress its horrid form upon the embryonic infant without physical contact with the mother's body, is so well authenticated as to defy doubt by an intelligent person. It is therefore certain that the mind, only, of the mother was the conducting medium through which the monstrous form was transmitted and impressed upon the physical organism of her infant. This process of transforming the infant's body into the shape of a monster we do not comprehend. We may suppose reasonably that the mental and vital being for the moment takes the abnormal form of the monstrosity which she sees, and on account of the fright which it produces, and thus gives shape to the vital organism of the embryo, which, more plastic, becomes permanent, and around which the physical corpuscles are afterward deposited by the bioplasts, thus causing the embryo to develop into that form. This, however, is only hypothetic. If it is more reasonable than any other hypothesis, we are forced to accept it, at least tentatively, or till we can invent a better solution. We can, on our supposition, only regard the vital and mental organism of such a child as first taking the same monstrous form that its physical body afterward assumed, since the body must be shaped and built up by the action of the working bioplasts in following the outlines of the incorporeal organism as their sole guide and pattern. This is fully illustrated in reply to Dr. Battle in the June *Microcosm*, last volume As to the difficulty of scars, birth-marks, deformed parts, and tattoos not disappearing by the constant physiological changes which occur in the waste and wear of organic bodies, we would remark, that this waste and wear does not necessarily interfere with the *form* and *color* of the physical structure. A particle of a scar, or birth-mark, or club-foot disappears by waste and a fresh particle of substance takes its place, thus leaving the form undisturbed. But foreign substance, as India ink, inserted under the cuticle not being organic, remains permanently fixed, not being subject to the laws of physiological displacement and substitution, any more than lead bullets which soldiers have carried through life.

As to the transmission of diseases from parents to children there is a great mystery involved. Mental diseases must manifestly depend upon the mental organism alone for transference. Physical diseases, such as consumption, scrofula, syphilis, etc., which, as now generallybelieved are spread through organic substances by self-propagating organisms or bacterial parasites, may depend chiefly on the physical substance which, however small the quantity, descends from parent to child, and, by multiplication of such poisonous animalcules, may continue in the system resisting displacement, and thus finally bring about death. In the case of small-pox and the well-known beneficial effects of vaccination, we have a theory which we have long held provisionally, and will here give for what it is worth. We suppose the virus of small-pox, which exhales from the diseased body and passes off into the atmophere or clings to clothing, to be living germs of bacteria which in suitable soil, or blood having the proper affinity for the disease, will hatch and multiply by throwing off similar living germs till the whole body becomes diseased. If the blood of a person be not in the physiological condition to furnish suitable soil or nourishment for propagating these germs, he may inhale them with impunity and even sleep in a pest-house without danger. But if the blood have the right affinity for the bacterial germs a single inhalation of impregnated air will start the disease by starting the bacteria. Now inoculation, (by putting into the circulation bacteria of a milder type of disease) tends to ward off the more dangerous type, on the same principle that a city garrisoned by friendly soldiers tend to counteract the enemy's forces by fighting them off or destroying them if they chance to enter the gates. Though the friendly garrison is a curse to the city it is less so than it would be to suffer devastation by the enemy.

The same may be considered true of all infectious or contagious diseases, and we see no reason why consumption, scrofula, measles, scarlet-fever, cholera, and even whooping-cough,—all of which originate no doubt in bacterial germs,—may not be prevented by suitable vaccine, could it be found, containing a garrison of a milder or less unfriendly type of bacteria which would protect the blood from invasion by these different hordes of dangerous enemies. We need not be surprised to learn before the present generation passes away, of the discovery of a perfect vaccine for counteracting the various physical diseases that flesh is heir to, and that vaccination for small-pox was but the entering-wedge which will ultimately drive from existence all kinds of contagious and infectious diseases.

EXTRACT FROM THE "TRIAL."

(Concluded from Last Month.)

[*Cross-examination of Prof. Bioplasm continued by Mr. Discerner-of-facts*].

Very well, I will take you to another part of the subject. Do you really believe, Professor Bioplasm, that all the complex forms of life now upon earth, originated with this pin-head sized globule of jelly you call the moneron?—That is the most recent suggestion as to the origin of life.

How do you conceive the process of development began?—By improvement in the development of the moneron, I apprehend.

Have you really succeeded in conceiving of the possibility of improvement in a pin-head sized globule of jelly, composed of a "single substance," as you say, and lacking all organism as you assume?—I apprehend it is facts, and not conceptions, with which science deals.

But we are trying the facts—the alleged facts—by the conceptions: you recollect you admitted that supposed spontaneous generation countless ages ago, was largely a matter of conception—imagination, I think, you said?—Yes.

Very well, I want to see your conception, if possible. Does not the theory of variation and development of species require the co-relation and interaction of various substances and organs in the creatures varied and developed?—Undoubtedly.

Then, how do you succeed in applying the idea of variation and development to a creature like the moneron, with no organs, and of a single substance?—We are obliged to assume the fact of such development without being able to define exactly the *modus operandi*.

What! assume the fact of such development in the presence of myriads of monera that have undergone no modification or development for countless ages?—Your question, I admit, has considerable pertinence. I am not able on the spur of the moment to meet it.

Let me direct your attention to another point. You are, of course, aware that the theory of evolution holds that development by natural selection can only work by *inheritance?*—Yes, that is generally held by evolutionists.

The founder of evolution has said, has he not, that "unless favorable variations be *inherited* by some, at least, of *the offspring*, nothing can be effected by natural selection" (*Origin of Species*, p. 9)?—Yes.

He lays it down, does he not, that "natural selection acts only by the preservation and accumulation of small *inherited modifications*" (p. 75)?—Quite so.

Very well, how do you apply the law of development by inherited modifications, to a creature which has no heirs?—I do not quite understand you there.

You are aware that the moneron has no offspring?—You refer to the mode of propagation.

I do: is it not the fact that the moneron, at a certain stage, simply divides into two after "pinching in," and that the two halves grow each to the size of the one before it divided, and again divide?—That I believe to be the fact.

Then what I want to know is how such a creature could transmit improvements by the law of heredity. Inheritance implies parent and offspring, but when a moneron splits up, there is neither parent nor offspring, but simply a duplication of the original individual—each half being as much an essential and identical part of the original moneron as the other; and how in that case could an improvement be transmitted?—I do not exactly follow the difficulty.

Well, supposing it possible for a moneron to take on an additional organ by some law of improvement, or the rudiments of one, when the splitting up moment came, would not the added organ be halved, and thus reduce at the very start?—I think I see your question.

Suppose it were two eyes, for example, the first division would give one eye to each half or both eyes to one half; and in either case, nothing would be done to extend the improvement to other individuals of the race. The improvement would remain and perish with the individual moneron in which it originated?—There is some force in that.

How is it possible then that the moneron can be "the primeval parent of all other organisms," seeing that the mode of its propagation, by the self-division of its body, shuts the door against the possibility of improvement by transmission of inherited qualities?—You present a difficulty I confess I had not thought of.

Now, Professor Bioplasm, let me put before you the fundamental maxims of evolution, and see how they are affected by the facts elicited in your cross-examination. Will you admit that without natural selection, there can be no evolution or transmutation of one species into another?—Yes.

Will you admit that without the inheritance of variations in a species, there can be no natural selection?—Yes.

Will you admit that inheritance is impossible among monera, which propagate by the self-division of their bodies?—That is a new proposition to me, but I confess I do not see how to evade it.

Does it not follow that, as a scientific demonstration, monera cannot be "the primeval parents of organisms," developed by inheritance?—I should require time to consider that sweeping conclusion. I admit its plausibility.

Would not the acceptance of that conclusion involve the overthrow of the entire theory of evolution?—I don't know about that. There are other facts in nature, quite independent of the moneron, that seem to require that hypothesis.

Such as what?—Such as the anatomical resemblance and typical graduation of organic beings, as shown in the fossil record of the geological strata.

In what way does that necessitate the theory of evolution?—It shows a gradual improvement of species as ages went on, on what I might call a common ground-plan.

Would not the gradual improvement of species upon a common plan be quite consistent with the special creation of each species?—That would be a miracle you see, therefore unscientific.

Do you call a miracle unscientific if proved?—Ah, if proved, that is the question.

Must there not have been a miracle at the start, if the theory of the Win Dar school of evolutionists be the true one?—As I have admitted, they assume the miraculous infusion of life into a few original organisms.

Are you prepared to assert that that idea is an untenable one?—I have indicated pretty freely, I think, to what school I belong.

The spontaneous generation school?—Quite so.

But I think, too, you have admitted the shakiness, to say the least, of the spontaneous generation hypothesis?—I admit it is not a demonstrated hypothesis. From the nature of things, it cannot be demonstrated. On the other hand, it cannot be disproved.

I think you nearly admitted it was disproved by the objections I raised?—Your objections were pretty tough, I allow.

Probably on a thorough consideration of them, you will admit they are fatal?—I don't know, of course, what conclusion I may come to on a re-consideration of the subject.

Let us suppose you hold on to spontaneous generation. should you not consider that as wonderful as any miracle?—I don't know.

What? the appearance of a living creature (however small and simple) with parts intelligently contrived to enable it to move, grow, and propagate without any intelligent power existing before it to contrive it: should you not consider that a very marvellous affair?—I admit that, putting it in that way, there is a certain amount of marvel about it, of course.

"Putting it in that way," Professor Bioplasm: is that not the simple fact of the case, if your theory be correct, that a living creature was made, and nobody made it: that an intelligent contrivance of parts to fulfil functions came about without intelligence to contrive it: that organic life spontaneously generated, or came itself of and by itself, without any pre-existing life to initiate or give it form?—I admit it looks a little extraordinary.

Is it not quite extraordinary?—Well, perhaps it is.

Quite as extraordinary as any miracle?—A miracle, you see, is unscientific; it is out of the range of experience.

Did you ever know of spontaneous generation occurring within the range of your experience?—No.

Did you ever know it occur within the experience of any other man?—No.

Did you ever hear of its occurring in the experience of any man anywhere, at any time?—I have admitted it is not possible now.

And yet you call it scientific—a thing that never occurred within known experience, which you admit cannot occur; which you think may have occurred certain millions of years ago; and yet against the occurrence of which, there are reasons and objections which you cannot answer; you call such a hypothesis scientific?—It is an induction of science.

That is, a suggestion, a guess by men who call themselves scientific. But miracle, of which the world has heard, which has been credibly testified to in many cases, which is the only explanation of the system of things existing in Christendom, and which, even in the domain of nature, the most eminent naturalists of the day hold to be the only satisfactory explanation of the start of life upon earth, you call that unscientific?—I cannot help the choice of terms which express my ideas.

Very well, it will be for the jury to judge, Professor Bioplasm?—It will be for the jury to judge, and of course each man for himself.

Quite so: I return to the question: Would not the gradual improvement of species, upon a common ground plan, as I think you described it, be quite consistent with the fact of the special creation of each species as it appeared?—It would not, of course, be absolutely inconsistent.

It would be characteristic of wisdom, would it not, to observe a common plan in the multiplication of varieties?—It might be so.

Can there be any doubt about it; why should wisdom vary for variation's sake?—I don't know what you mean by wisdom.

I mean the Eternal Power, in whatever form it may exist, from which all things have come?—We know nothing of such a power in science.

You must, Professor Bioplasm, recognize some sort of power, or force, or energy, as the antecedent of nature?—I look at nature in itself.

But you allow, I presume, that nature did not always exist?—Not in its present condition.

Did it exist at all in those inconceivable ages past, when things had not begun to travel towards the present wonderful order and beauty manifest in the universe?—As a system of nature it did not, of course exist.

Very well, but something existed: because, if nothing existed, nothing could ever have come?—Force existed, I doubt not.

Do you know what force is?—I know it as a fact.

Do you know what it is in itself?—I admit that we cannot know it in that sense. It is unknowable.

Very well, whatever it is, you must recognise wisdom as its attributes in view of the system of order, and adaptation, and beauty that has come out of it?—I cannot, of course, demur to that, but wisdom is so essentially connected with the idea of personality that I cannot understand it as applied to the force of the universe.

Wisdom doubtless involves the idea of personality; and may not that force which exhibits such admirable wisdom in the concretion of itself, if I may so say, have a personal nucleus, and be, in fact, the illimitable extension of that personal nucleus after the analogy of the irradiation of light?—That would be the idea of God at once.

Perfectly so; and what objection?—Well, I say it is not scientifically demonstrated. It is outside the range of scientific observation.

That I grant; but does it follow that it is inconsistent with scientific observation?—That is another matter.

Is it not the fact that the universe is too great for science to skim even in the most superficial way?—It is doubtless greater than we can conceive.

Is not human observation of the universe, and human capacity for reflection, too puny to allow of the faintest conception of the problem of its derivation and mode of subsistance?—I must admit the truthfulness of that observation.

Very well, returning to the point: wisdom is manifestly in the universe, though science cannot tell us how it acts; and that being so, my question is—is it not characteristic of that wisdom to work on one general plan?—That I cannot deny.

Then if that wisdom specifically created each species as the time for its appearance arrived, is it not to be expected that it would work on the plan of typical graduation on a common anatomical plan, and not introduce a new plan with each new species?—Of course, if it was so, it was so.

I am claiming that there is nothing in typical graduation of species inconsistent with the idea of specific creation?—But specific creation is unproved.

Never mind, if it is unproved, which I do not admit. I am showing there is no force in your contention that evolution is necessitated by the fact of a gradual perfection of species in the order of their occurrence in the geological strata. Is it not the fact that the species in the strata are all distinct, and that there is no such perfectly ascending chain of development as ought to exist on the hypothesis of the transmutation of one species into another?—I admit we have not yet completed all the links.

Have you completed any?—Not absolutely.

Can you show any perfect gradual shading off of one species into another in the case of any single genus?—Not so perfect as we should like.

Can you show a perfection at at all? Is it not the case that between the most clearly allied species, there are gaps and breaks which would require ages of slow modifications on the evolution hypothesis to pass from one to the other?—I should be glad to be able to contradict you.

But you cannot?—Not so directly as I should like.

Is it not also the fact that each species found in the fossil deposits is found at its best when it first (or lowest down) occurs in the stratum where it is found?—That of course is the well-known fact.

Is that consistent with the idea of a gradual transmutation from a prior species to a higher and higher state of development?—It may look the other way a little.

Is it not more consistent with the idea that each species was specially created when the time arrived for its introduction?—I must allow it agrees with that idea.

Is it not perfectly consistent with that idea? Nay, does it not distinctly point to that conclusion, and exclude the hypothesis of a gradual development to a more perfect form?—I know that is the use made of the fact by the opponents of evolution.

A legitimate use you must allow?—I have no doubt they think so.

Have you anything else to urge on behalf of evolution?—Well, in fact, there is a great deal to be urged that I should think you cannot wish me to go into. There are facts connected with embryology and rudimentary organs, and reversions—curious and interesting facts, all tending more or less to establish the hypothesis of evolution. In fact, they place the hypothesis beyond doubt in my mind.

I could follow you in these facts Professor, and dispose of them as effectually as I think you feel I have done in the case of spontaneous generation?—I should like to see it done, for I only desire truth.

I should recommend you to read Mr. Hall's book (*The Problem of Human Life*), to which I have already referred, and whose guidance I have more or less followed in this cross-examination. He goes thoroughly into all these points, and in the most effectual manner, as I think, refutes the evolutionist argument upon all of them. Not only so, but he raises quite a host of insurmountable objections to that hypothesis in detail?—I shall take an early opportunity of reading the book.

I think you will find that "the invincible scientific difficulties" you spoke of in the early part of your examination, all disappear, and that you are at perfect liberty to accept the evidence of Christ's resurrection without feeling that you are coming into collision with truth in any other direction?—I should be glad to find myself in that position: for I freely admit that the doctrines of evolution deprive us of the comfort of those personal hopes which are doubtless such a solace where they can be reasonably entertained.

Re-examined by Mr. Dontwanto Believeanyhow: You don't admit, Professor Bioplasm, that my friend has overthrown your evolutionistic positions?—No, I only wish I could. I admit he has raised some good points.

Good points can be raised against anything?—I suppose so.

There are always two sides to every case, as the saying is?—Quite so.

You have no doubt in your own mind that the moneron came into existence by spontaneous generation, and that from the moneron have sprung all other forms of life upon earth?—That is our theory.

Including man?—Including man.

And that consequently the cosmogony of the Hebrew Scriptures is a piece of pure speculation?—I have been accustomed some time to think so.

And that consequently the idea of the resurrection of Christ, which is bound up with it, is an impossible idea?—That would follow.

Whatever amount of evidence may be brought forward in its support?—No amount of evidence can, of course, prove a mythical idea to be true.

My friend made much of the fact that the moneron exists in extensive numbers at the present day?—He laid some stress on that circumstance.

I presume it presents no difficulty to your mind?—I have not been in the habit of regarding it as a difficulty.

My friend asked why they hadn't developed into a higher form; I presume the explanation, of course, would be, that—ah—the developing influence of—ah—favorable environment—did not come into play in those cases?—That is the explanation put forward by the evolutionist theory.

You consider it a perfectly satisfactory explanation?—Well, so far as it goes, no doubt it is satisfactory.

The others that gradually developed into molluscs and other invertebrate creatures, and then into the various classes of vertebrates.—fishes, alligators, lions, giraffes, hippopotami, elephants, dogs, monkeys, man, and such like—they did so through the favorable effects of appropriate environment?—That is the theory.

And you have no doubt about the theory?—I have not before to-day entertained much doubt.

The theory is entertained by a great many respectable people?—Yes.

And is, in fact, likely to become universal?—The appearances have been that way.

And you do not doubt that the appearances will be realized?—I do not know.

I do not know that I need put any further questions to you. We are exceedingly obliged to you for your attendance here to-day.

☞This portion of the cross-examination, as in the other part, last month, is taken entirely from the *Problem of Human Life*. We have sent to England for some of these remarkable books, (*The "Trial,"*) and will supply any that may want a copy by mail at $2.

OIDAL THEORY OF SOUND—No. 1.

BY PROF. H. HOWARD.

The Explanation of natural phenomena requires an ocean of force, the hand of ONE ALMIGHTY WISDOM. A form of force which may be designated *Oid* surrounds each body as a constant reinforcement of the energy that fills it! The oids are also a part of a system of *teleforce* between matter and the mind. As a stand-point for a glance over the field of inquiry we will assume that:—

1. Initial Sound is a collision of the disturbed

molecules of force and is transmitted from molecule to molecule until expended, through an enlarging sphere of distribution in the ocean of force.

2. Volume of sound depends upon the volume of force disturbed within the compass of immediate or initial resonance. The initial resonance includes those molecules of force so resonant with the initial sound-impulse as to increase the volume of the sound.

3. The distance sound will travel, through open space, other conditions being equal, depends upon its volume.

4. Loudness of sound depends upon the degree of the initial compression of the molecules of force. A sound may be loud or stunning to the ear near to the place of the shock and yet be of so small a volume as to be heard but a short distance.

5. The pitch of sound as produced through musical instruments or sonorous bodies of the same class is *inversely* as its volume. Increase of volume is lower pitch and *vice versa*.

6. Tone of sound as to its character of soft, or harsh, etc., depends mainly upon the condition of the force disturbed, as free, or as exerted in uniting the particles of a sonorous body of one sort or another.

We will first glance at the sound-producing operation of force in connection with a bell. The bell is suspended and of large size. The blow from its hammer is a concussion of some of its molecules upon some of those of the bell at the point struck. This molecular disturbance is transmitted throughout the mass of the bell. Millions of molecules thus collide and recoil, and their resilience brings another clash of molecules at the side of the bell having received the hammer-blow. Thus forth and back these sound-impulses go and clash and recoil with inconceivable velocity, increasing through resonance, especially of the *oid*, the volume of sound to the ear. The molecules of force uniting the particles of the bell and composing its *oid*, transmit their disturbed condition to those next without the compass of the initial resonance. These again convey the sound impulse to those further off and these again to those more distant. As the sound advances from its centre outward and its circle becomes larger the molecules distribute their sound-force to a larger and still larger number of molecules, until, through division and distribution the sound-impulse, at a distance of several miles from the bell, is too slight to be heard. The weight and size of a bell as is well-known will determine the volume and the pitch of its sound, and the distance the sound will travel. This principle operates also through instruments of music; the larger instruments being of a lower pitch. The lower notes flowing from points nearer to the outer ends of wind-instruments are thereby produced through the initial resonance of a greater volume of force.

Strike a piano-string and hold the hammer upon it so that the string cannot vibrate. That single movement of the string will produce a sound. That sound will have a pitch. The successive vibrations of a string only prolong the sound by so rapid a repetition of it that the ear cannot detect the intervals between the vibrations, and they are heard as one note. The *larger* strings with greater *oids* disturb a greater volume of force, and give greater volume of sound with lower pitch. But the distinct resonance of *each* vibration of a string may be cut off and limited, to the ear, by the next after vibration and so the volume, by more rapid vibration, may be decreased and the pitch raised. Through the same principle the "*double siren*" by cutting off the resonance of the sounds from each orifice of the *single* siren may raise the pitch by decreasing the volume.

The wave-theory may have arisen from the coincidence of pitch with frequency of vibration and a failure to notice the dependency of the pitch upon the volume of sound; or that volume and pitch have the same cause, in the volume of force disturbed.

Our limited space defers the discussion of tone, "Sound-color," etc., to a second article. We may here add but an assertion and a clinching fact for the Oidal Theory. It is the *oid* of the "Transmitter" of the telephone which receives the sound of the voice. It is the *oid* of the "Receiver" of the telephone that conveys the sound to the ear. It is mainly the *oid* of the telephonic wire that transmits the sound-impulse. A very forcible practical illustration of this, alone almost a demonstration of the principle, was lately published as having occurred in one of our larger cities. In placing telephonic wires to cross a river, several wires were placed within a tube and the tube sunk below the river. When a message was sent by one of those wires it went also to the terminus of each and every wire in the tube. The *oid* of each wire as it extended to and mixed with the *oids* of the other wires in the tube formed the *oids* of the several wires into one volume of *Oidal Force*. When the sound-impulse through the *oid* of one of these wires passed into the tube it was imparted to the commingled *oids* of all the wires in the tube and so was transmitted to the terminus of each one of the wires. This proved not the best arrangement of telephonic wires for confidential communications.

THOUGHTS—WHAT ARE THEY?

BY ELD. H. W. B. MYRICK.

In my article on Mind and Matter I think it was clearly shown that there is a "power behind the throne," and this, too, after admitting that thought is generated by the molecular action of brain substance. Infidelity is very easily satisfied, and upon the assumption that thought is *generated, made, manufactured* by the brain, materialists predicate their scientific (?) declaration that death ends all. But we have seen that although thoughts are created, or generated in the brain-matter, THEY ARE MADE TO ORDER. There is a potent, subtle something, which defies all the power of materialistic analysis, that sits undisturbed on the throne of reason, and directs the brain-work so that thoughts are controlled and formed *at will* upon differing subjects. This is the death-knell of materialism. All that is asked being granted, the frail, feeble thing goes to pieces on the stubborn fact of *pre-existing intelligence*, which "shapes the destiny of man." Just what this subtle power is we may not define. It is embodied in the expression, *I*, in that mystery we term *consciousness*. We may approach the "inner temple" of the soul by our modes of reasoning, but at last, with uncovered head, we must pause before that subtle barrier that shuts off the invisible and immutable. The keenest power of the human mind cannot draw aside the veil and reveal the fountain of all thought and energy. A noted Infidel has truly said, "The true nature of the mind will forever remain concealed." And that one concession takes all the life out of every materialistic proviso and hypothesis.

Philosophers talk of atoms which they call "ultimate atoms." Now with respect to this conscious, intelligent director of human thoughts, may we not call it an "ultimate" atom of Spirit, of God, and calling it thus be satisfied to rest the case. "What man knoweth the things of a man save the Spirit of a man." In this way Paul indicated the problem of human consciousness.

But as we have admitted thoughts to be the result, or creation, of molecular action, *what are thoughts?* An Infidel recently propounded to me, through the *Iconoclast*, the following: "Is not thought an entity as much as mind? Since reading the "*Problem of Human Life*" I have looked on the world, both natural and Spiritual, from a new and elevated standpoint. A *thing* to me, in the light of the "*Problem*," is indeed a *thing* a veritable substance. This being true, there are "more *things* in heaven and earth" than most of us have dreamed of in our philosophy. We used to speak of heavy, palpable materials understandingly, but would refer to light, or sound, or gravity, in a vague way, using the rather indefinite pronoun, *It*. While there were some things without names, we had a great many *names without things*.

We made a distinction between a shadow and the substance, but now we begin to see that even what we supposed to be but a shadow is substantial. In a word, we begin to see that a line is drawn, and that *everything* is on the one side, *nothing*, *nihil*, on the other. All *things*, then, have a substantial existence

When light strikes my eye, or sound my ear, or the air my body, I am instantly conscious of it. Here are three external causes which produce sensation, and appeal to my consciousness. I express the *effect* of these causes in one way, as, *I am conscious;* or in three, as, *I see, I hear, I feel.* Now, as a cause must be a positive, substantial something in order to produce an effect, I conclude that light and sound are substances.

R. G. Ingersoll truly says, "A cause, *acting on nothing*, would produce nothing." And we reverse the matter and say, that, "*Nothing* acting upon a cause, or anything, would also produce nothing." From which we see that whatever produces an effect must have a substantial existence. I would define consciousness to be the *effects produced on the mind by causes.* And by the mind I mean that subtle power which we call the Ego, the I, the inner man of Paul. It is that which directs and controls the brain-work and so makes, or generates, thought. Now one other conclusion, which is this: consciousness is *back of thought.* This is fatal to materialism, but it is true. For instance, the light strikes my eye and there follows: first, conscisusness; second, I *think* there is light. The two are nearly simultaneous, but in point of fact, as the thinking man will readily see, the fact of consciousness precedes or goes before thought, Thought *is an expression of conciousness*, just as words are an expression of thoughts. Take a word and follow it back. It is the sign of an idea, the expression of a thought. We have found the idea back of the word. But we go back of the idea, or thought, and we find consciousness, of which the thought is *only an expression.* Here we rest. This is, to my mind, a fair definition of thought.

Back of consciousness I care not to go. It is inseperably linked with that mystery we have spoken of, the *I*, the sentient, guiding self-hood. In the presence of this conclusion materialism must impale itself on one of two horns. First, it must say that the atoms of the brain are conscious, intelligent, and direct their motions so as to produce given thoughts, or else; Second, that mind or consciousness is independent of matter and anterior to molecular play. Either position is fatal as can be seen at a glance. Do the scientific materialists realize the crushing nature of this problem of consciousness? Let us see. Dubois-Raymond says: "Nor is it possible to explain how, out of the acting together of atoms, *consciousness should arise.* Even if I should conceive the atoms themselves to be already equipped with consciousness [one of the horns above suggested], I should not thereby have explained consciousness." *Lecture on the Limits of our Knowledge.* Prof. John Tyndall says: "The passage from the physics of the brain [molecular motion] to the corresponding facts of consciousness *is unthinkable.* Are these physical processes connected with the facts of consciousness? The chasm between the two classes of phenomena *remains intellectually impassable.*" Prof. Tyndall, this daring scientist, thus confesses his inability to solve the problem. Those lesser lights, who talk glibly of mind as a result of matter, and who scoff at the puerility of believing in a hereafter, are kindly recommended to sit awhile at the feet of this acknowledged chief of free thought and skeptical science. They might possibly learn something from his Belfast address. Such an utterance, from such a great man, should profoundly influence men of smaller calibre. My experience is, however, that the less a "scientific" (?) man knows the louder he howls his dogmatism and blasphemy. The more a man knows the *less* he feels like an oracle. Some men have a great many things to learn.

GENTRYVILLE, MO.

ELECTRICITY THE MOTOR POWER OF THE SOLAR SYSTEM.—No. II.

BY B. T. KAVANAUGH, M. D., D. D.

RESULTS OF THE MAGNETIC POLARITY OF THE EARTH.

There are several legitimate results growing out of the magnetic and polar constitution of the earth, not recognized as such by the Newtonian theory, and not sufficiently elaborated in my former article, to which I now proceed to call attention.

1. The interchange of the ocean currents between the poles is one of these results. It is known that not only the boreal and austral poles, but nearly three-fourths of the earth's surface, are covered with water, and hence there is an excellent medium for magnetic connection between them. It must be borne in mind that as the whole earth is strongly magnetized, and the force of this magnetism centres in the poles, the magnetic power concentrated at each is very great, as is shown by the effects produced.

The waters covering the boreal pole, over a very large surface are thrown into a strongly positive magnetic condition, and as positive repels positive, they are sent off with great force sweeping around the globe bearing towards the equator, and passing it, they make their way to the austral pole under the double influence of repulsion from the north, and the strong attraction of the negative austral pole. As this current sweeps near to and passes over the negative or south pole, it changes from the positive to the negative condition, and is again repelled in an

opposite direction around the globe, controlled by the channels of the ocean, back to the north pole, now attracted by its positive force. Thus a ceaseless circulation of the waters of the deep is produced, carrying beneficial and healthful results to all parts of the earth, and aiding in the equalization of the temperature of the ocean, as in passing from either pole to the other the waters are subjected to tropical heat which they modify.

The icebergs formed in the polar regions are by these forces carried towards the tropical seas, whence, by a natural process they are dissolved and their magnetic condition subsequently changed by the opposite polarity. The narrow limits of my space will not permit me to go into details here.

2. The atmosphere of the earth with all the meteorological phenomena connected with it, is controlled by the combined electric agencies of the magnetism of the earth and the electricity from the sun producing a system of permanent, periodic, and temporary, high and low barometers, which regulate and control atmospheric action.

There is a central permanent low barometer lying along the equatorial line over the ocean, and two permanent high barometers, one on each side and parallel with the great central low barometer, 23½ degrees distant, forming the outer boundaries of the torrid zone. Through these two high barometers there is a descending current of air, cool and pure, which divides, sending off on the equatorial side a current which flows to the central low barometer through which it rises to the upper surface of the aerial ocean. These currents called the Trade Winds greatly reduce the temperature of the torrid zone. The other half of each current flows outward to the polar regions unless interrupted by a periodic or temporary low barometer.

There are two great permanent low barometers, one covering each pole which form an open vortex through the atmospheric regions, by which the winds and the accumulated excess of electricity find exit. The latter in our hemisphere giving us the Aurora Borealis. When the sun is on the opposite side of the earth, the excessive current of electricity accumulated during the day, under a favorable state of the atmosphere, is seen at midnight repelled upward, forming the grand display of the "Northern Lights."

Thus the polarity of the meteorological system relieves the earth of any excess of the forces essential to its own action. This reference to meteorological phenomena does not properly belong to the astronomic doctrines for which I contend, except so far as to account for the Aurora Borealis, and incidentally to show that electricity is the prime agent by which all natural phenomena are produced.

For a perfect knowledge of this system the reader is referred to Prof. Tice's able work on Meteorology, based on the electric theory, published at St. Louis.

3. The polarity of the earth has much to do with giving to this planet its fixed position and relations to the sun—the inclination of the poles always bearing the same position in all parts of its orbit in its revolution around the sun. The plane of the orbit is so arranged that at the vernal equinox the sun's rays fall equally upon the earth from pole to pole, but as it proceeds from March 21st to the Summer solstice, June 22nd, the north pole is brought gradually under the light of the sun until it shines 23½ degrees beyond it. Though there is a vast difference in the electric condition of this pole when fully charged with electricity from the sun, and when just emerging from the shades of polar night, yet, it being the centre of positive magnetic polarity, when it is presented to the sun's rays the general attraction between the sun and the earth is much less than when the magnetically negative south pole is presented. As the north pole is positively magnetic and the solar rays positively electric, there is a comparative repulsion between these two positive points, and hence the earth is now repelled by the sun to the most distant or aphelion part of its orbit. As it progresses to a higher point and this pole gradually recedes, the repulsion ceases, it is again attracted so that at the autumnal equinox, Sept. 22nd, it has recovered the distance lost in its outward movement and is as near the sun again as on March 21st. From the 22nd Sept., in its course to the Winter solstice it continues to rise so that the austral pole in a magnetically negative state is brought into light and the earth is therefore now attracted till on the 22nd of December, it reaches its nearest or perihelion point of its orbit, when fully charged, it is again repelled.

Thus it is clearly evident that the polarity of the earth necessitates the elliptic form of its orbit as well as the inclination of its plane, otherwise the laws of electric action would be violated.

From the foregoing, every part of which is sustained by well established facts, it will be seen that the diurnal and annual motions of the earth are rationally and sufficiently accounted for without the agency of gravitation in any of the motions involved.

"WHO WILL CONTRIBUTE ?"

Prof. Henry C. Cox, A. M., Superintendent of County Schools at Pontiac, Ill., sends us a letter with the above heading, and proposes that a collection be taken up among the readers of *The Microcosm* of *one cent each* to be expended in purchasing an elementary work on English Grammar for the benefit of Prof. Hornung of Heidelberg College, at Tiffin Ohio. Our readers will recollect his attempted defense of Newton against the attacks of *The Microcosm*, and how pitiably he got lost in the midst of a simple sentence. Prof. Cox generously suggests the Editor of this paper as the proper custodian of the funds thus to be collected. We dislike to assume such responsibility, but nevertheless will see that a suitable grammar shall be purchased and forwarded as soon as sufficient funds shall have accumulated. Send only *one cent* each, so that as many as possible may have the privilege of participating in so benevolent a work, and we will report the result by due notice in a future number of *The Microcosm*. Prof. Cox is duly credited with *one cent* which he has forwarded to commence the contribution, and which has been safely deposited in the Park Bank.

☞There is a movement now on foot, among Professors of Physical science who have become satisfied of the fallacy of the current theory of acoustics, to compel action on the part of the three eminent physicists reviewed in the *Problem of Human Life*. Students of science are at last determined to make these men speak out or know the reason why. We say, push the good work, and *The Microcosm* will keep the public advised.

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A. WILFORD HALL, Ph.D., Editor and Prop'r.

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SUBSTANTIALISM.

No careful observer of the tendencies of modern thought can fail to note the rapid spread in this country and Europe of *materialism*, which may be correctly defined as signifying that nothing can be known to exist beyond the recognition of our senses, or that cannot be proved to exist by chemical, mechanical, or other physical test. All else, outside of such physical recognition, whatever may be the phenomena exhibited, come under the general name—*modes of motion.*

For many years past scientists have been seeking to meet the evident questions that have constantly been growing out of the invisible and intangible phenomena that everywhere address us in physics and metaphysics, and which, to ordinary minds show cause and effect as if the results were produced by the actual contact of real substantial things. Philosophers have been fearfully puzzled and agitated over these problems, and though utterly unsatisfied with the meaningless phrase, "mode of motion," they have still clung to it as better than nothing, either not daring to strike out into a radical departure that would mean something real, or else not knowing what kind of a departure would best help them out of the difficulty. They have seen, for example, that magnetism would draw a bar of iron from a distance toward the poles of the magnet, and that it would thus act even through the most impervious of bodies, such as sheets of glass, as if nothing intervened. But they could not grasp the conception that this magnetic force was a real substance of some kind, because to them the insuperable difficulty of any kind of substance passing through plates of glass as if they were not present, stood in the way. Hence, following those who had preceded them in such investigations, and chained to the text-books on the subject, they contented themselves with supposing it to be one of the mysterious *forces* of Nature and continued to view it under the general idea of some sort of a *mode of motion.* They never stopped to ask, what is it that *moves?* Something must *move* of course or there can be no mode of *motion.* The magnet does not move, evidently, neither does the intervening glass. The only movement that can be recognized is plainly that of the distant bar of iron. But that does not constitute a "mode of motion" any more than does the lifting of a book by taking it in one's hand constitute a mode of motion. In the latter case we do not resort to any such unsatisfactory or meaningless expression, but recognize the fact that the substantial hand moves the substantial book by actual contact with it. But even if the molecules of the magnet should move or vibrate among themselves, what could this do toward reaching out and drawing the distant armature? Nothing but the projection of an actual substance can do it.

The same is true of every physical act which we observe in the whole field of mechanics. Effects are produced by the contact of one substantial thing with another. But in trying to analyze the operations of the forces of Nature, physicists became mystified by their own want of perspicacity; and because they could not analyze or tan-

gibly recognize these moving forces as substantial entities, and these processes as resulting from their actual contact, they failed to recognize their existence. Hence some word such as *force*, or some phrase such as *mode of motion* had to be employed as a substitute for other more satisfying expression.

The same was true of gravitation. An apple, for example, was seen to fall to the earth, but it was impossible for the physicist, even as great a man as Sir Isaac Newton, to conceive of a real substance reaching out from the earth and siezing the molecules of that apple and drawing it downward as we would pull a boat to the shore by means of an invisible rope. Hence philosophers have tried to be satisfied as usual in explaining gravitation, with the vague word force or the more indefinite and meaningless phrase *mode of motion*. The same vaguity, if we may be permitted to coin a word, has at last extended itself to electricity and heat, as it had for a hundred years before extended itself to light, and for all time been applied to *sound*, till finally the more able and ingenious opposers of religion, and of the probabilities of a future life for man, have adopted this same "mode of motion" as the solution (!) of vital, mental, and psychical phenomena, contending that as nothing really exists in man or animal save material substance, hence vitality and mentality are only the effects of the motion or play of the physical molecules of the brain, nerves, and other portions of the corporeal body. We need not quote the proofs here. This we have done abundantly in the *Problem of Human Life* from the highest and ablest materialistic authorities. But note the absurdity, and self-contradiction. While the physical molecules of the magnet do not stir in the slightest degree to draw the armature, and while the physical particles of the earth do not move in order to pull down the falling apple and thus constitute these *modes of motion*, yet the physical molecules of the brain must oscillate to and fro in order to move the hand or foot of a man, or beast, according to these sage materialistic philosophers! They fail to see the weakness of thus calling gravity and magnetism a *mode of motion* with absolutely no moving particles in the earth or magnet to constitute such "mode," and with equal absence of reason and logic they fail to see the self-stultifying effect of making the movements produced by mental and vital force result entirely from the *physical vibration* of the corporeal particles of the brain, *without any moving power behind them to cause such vibratory motion.*

But the world is advancing. It is beginning to be realized and, we are thankful to say, very rapidly, that as certain as no effect can be produced without an adequate cause, so long held by philosophers of all schools, just so certain is it that no corporeal body, whether it be an armature, a suspended weight, or an animal organ, can move or stir without the actual contact of a real substance either corporeal or incorporeal. This incontrovertible proposition leads to another postulate equally self-evident, namely, that we are in the midst of two worlds of substantial entities, totally separated and distinct from each other in nature, yet inseparably interblended in many respects, namely, a world of physical or corporeal entities, such as come under the recognition of sensuous, chemical, and mechanical tests, and an incorporeal world of substances such as can only be recognized by the aid of the higher faculties of man, and can only be demonstrated to exist by the philosophical and metaphysical tests of logic and reason. Yet the existence of the latter world of entities is coming to be recognized with the same certainty, as is the former world of physical and sensuous objects and facts. This inevitable recognition of these two grand divisions of the universe of entitative existence leads to another almost equally important classification, namely, that as the physical world of substances consists of a graduated scale of entities from the denser to the rarer, from the grosser to the more refined, such as the metals, minerals, earthy substances, wood, water, flesh, air, vapor, the gases, odor, etc., so the immaterial world of entities presents a corresponding graduation of substantial existence, rising from the grosser to the more subtile spheres of Nature, beginning the ascent at odor, where the physical left off, and proceeding with electricity, magnetism, gravitation, heat, light, sound, life, instinct, mind, soul, spirit, up to God himself as the fountain of all life and mentality, and the ultimate source whence came the entire material and immaterial universe. The graduation so manifest in material substances all around us ought to suggest to a reflecting mind a continuance of this graduated scale into the immaterial and intangible world; for surely the difference between platinum and hydrogen gas, or odor, in point of attenuation or sublimation, need not be surpassed in rising above odor, for example, to reach the immaterial condition, and yet find substance as real and entitative as is a block of iron or lead.

Such classifications of substantial entities as here pointed out, gives us a basis for a *system* of scientific knowledge upon the subjects involved that might appropriately be called *Substantialism*, in opposition to the various phases of philosophy and metaphysics hitherto taught, which, so far from explaining the phenomena of Nature, involve them in deeper mystery and lead to innumerable self-contradictions; as witness the absurdities of *sound as a mode of motion* so fully exposed in this journal and in the *Problem of*

Human Life. Let *Substantialism* become the watchword of scientific investigators, and much that is now regarded as inscrutible mystery, especially along the border-land of the physical realm, will become clear as crystal. Let everything that exists or of which the mind can form a positive (not negative) conception be resolved and classified as parts of one or the other of the two great divisions of substance here generalized, and much of the mystery will disappear from physical and more especially from physiological philosophy, but most especially will it vanish from metaphysical and religious investigations. With *Substantialism* as the standpoint from which to take our systematic surveys of the here and the hereafter of humanity, the solution of the problem of human life becomes comparatively an easy task. Man becomes at once, to our intellectual view thus elevated, a dual being, having an "inner man" according to Paul, which is an absolute incorporeal *organism* according to reason and science, and which is even now the *counterpart* of the physical structure. According to this advanced scientific view, man at death simply steps out of the physical body into the psychical realm (a real, substantial world of entities), retaining his personal individuality and identity, and appearing to others as his immutable and very self more nearly than it is possible to appear while in the physical organism, liable as it is to mutation by growing age, and to constant change by wear and accident.

With *Substantialism* as our polar star, religion becomes a scientific verity which defies the assaults of skeptics, based as it is upon heaven as a veritable habitation, with the soul of man as an organized entity, with angels as real, intelligent, social beings, and with an allwise, living God as a beneficent Personality. Take from philosophy, science, and religion, this substantial and satisfying view of the visible and invisible universe of God, and recognize nothing as veritable but the tangible and sensuous half of Nature, and no wonder that thinkers by the thousand in this country and Europe are sliding down the inclined-plane of purely physical philosophy into the abyss of irretrievable materialism. It is rather a wonder that, under the influence of such doctrines as are taught for science and philosophy in most of our colleges, that any student who has waded through the entire curriculum has come forth a believer in God or possessing the faintest glimmer of a hope of a future life. It can only be because the intuition of a majority of the students is superior to the curriculum.

Were it possible for every college and university in this land at once to make the new departure here indicated, write over the door of each class-room the significant word *Substantialism*, and then proceed to inculcate the principles of science, philosophy and religion that this word logically and legitimately implies, we have no hesitation in believing that before one year there would be inaugurated the greatest and most intelligent revival of religion that the world has ever witnessed. Such an educational change generally adopted, would, before half a generation had passed away, revolutionize science, redeem society from infidelity, and consign materialism to its merited grave of oblivion. It is perhaps too grand a consummation to expect, but not too improbable a one to be devoutly hoped for; and with this view we intend to urge its claims upon the country in these columns, while we trust that our small army of contributors will not be lacking in their support of our efforts.

NEWTON'S BROKEN YARD-STICK.

Astronomers may well be astounded at the audacious attack, as they call it, made in this paper upon the most important demonstration recorded in Newton's *Principia*—the one which more than all others gave him his world-wide scientific reputation. It is, in fact, this chief demonstration of the fall of the moon from its tangent and its supposed necessary relation to the acceleration of a falling stone at the earth's surface, upon which the great law of gravitation was mainly based, and it is now manifest that upon the truth or falsity of this supposed relation must the law and the reputation of its author stand or fall. And well may astronomers and mathematicians be aroused and amazed when this assault in *The Microcosm*, in less than six months from its first announcement, forces Prof. Goodenow (one of the ablest mathematicians of the country, and the author of a book on gravitation), to confess that Newton's demonstration is only "a rough measurement," after he had previously maintained in a labored argument that it was a "real, true yard-stick,"—the result of "pure mathematics"! Then, the consternation is intensified as the great astronomers of the country read these fearful admissions of one of their own number, under the influence of Microcosmic blows, and as they reflect upon the fact that this same moon-demonstration of Newton has never before been called in question or doubted since the *Principia* was published, but on the contrary that it has been held and taught by tens of thousands of professors of mathematics and astronomy as almost inspired science, and as the most infallible demonstration by pure mathematics the world has ever seen. In the minds of these astronomers, judging from letters received, such a charge as the one made in this paper, that Newton's chief demonstration is utterly fallacious even to its smallest minutia, should be enough to consign its

author to the madhouse. But here it stands recorded, while in the previous number stand also the incontrovertible proofs that the charge is true to the letter. There, also, in the August number stand recorded the forced admissions of Prof. Goodenow that Newton's greatest demonstration is "not exactly the correct method," but only "a rough measurement"! Now what are astronomers and mathematicians going to do about it? Are they going to come out frankly and acknowledge that Newton was mistaken, and that his mistake grew out of his prodigious blunder in supposing that the fall of a stone during one second was the work of *gravity alone*, instead of being almost entirely the work of accumulated velocity? Or will they sullenly follow the example of Tyndall, Helmholtz, and Mayer, and suppose that by keeping silent the storm will soon blow over, and that by some sort of mathematical hocus-pocus Newton may come out all right? Be not self-deceived. Tyndall, Helmholtz, and Mayer thought the same about the wave-theory of sound, and they have kept silent these three years hoping that after a short Rip Van Winkle sleep they would awake to find the "Problem" out of print, its author dead, and the matter forgotten by every body. But the press at this writing can hardly turn out the "Problem" fast enough to supply the demand, and the author, so far from being dead, thank God, still lives, while the thunder of *The Microcosm* makes sleep difficult, to say the least. So will it be with astronomers who may now try to shut their eyes to the fact that Newton's "real true yard-stick" has been utterly broken, and his chief demonstration totally wiped out. A new and younger class of scientific professors and students are coming upon the stage —men just as brilliant and fully as wide-awake as any that have preceded them. From these we are now hearing by the score, and not only do they indorse our arguments against Newton's demonstration, but they re-enforce those arguments with additional considerations. We will close this article with a specimen of these letters just received from Prof. Hand, which of itself overturns Newton's demonstration by showing that no possible relation exists between the rate of the moon's departure from a fixed tangent and the acceleration of a falling body on the earth's surface. Here is the letter, and let mathematicians, including Prof. Goodenow, not fail to read it:

Dear Brother Microcosm: Allow me briefly to suggest a thought on the subject of gravitation, and the conservation of force which occurred to me on reading "Newton's Broken Yardstick," and your exposure of the bungling attempt to prove accelerated motion in the moon's fall, by that of a stone's fall on the earth's surface. In the case of the stone, the two moving forces, momentum and gravity, act in the *same direction*, while in the case of the moon the two acting forces operate *at right angles* to each other. Should either force cease acting on the stone at any instant, the other would continue to carry the body *in the same direction*; but should either force cease acting upon the moon at any instant, the other would carry it in the direction of its own force, and *at right angles* to the line of the ceasing force. Is not this enough to suggest the absurdity of Newton's demonstration, and to show that no natural or necessary relation exists between the acceleration of a falling body here, and the so-called fall of the moon from its tangent?

At this point it occurs to me that the conservation of force, on the popular theory, gets into a muddle.

Conservation, preservation, transmutation, and even convertability of forces, may do to talk about in the abstract. But if heat, light, sound, magnetism, gravity, etc., are only "modes of motion," and not real entities, is it not a little nebulous to try to think of the conservation of *nonentities*, or the convertability of one *nonentity* into another *nonentity?* If however, we regard these as substantial emanations, or *real entities*, as you teach, we have something *thinkable* at least, if not tangible, and which may lend material aid in the investigation of the subject. (See second chapter of the *Problem of Human Life*, p. 27.)

Fraternally, G. R. Hand.

Richmond, Mo.

AN OUTSPOKEN REVIEW.

Quite a number of our readers have inquired why it is that no able and exhaustive reviews of the *Problem of Human Life*, have yet appeared in our great church quarterlies. We answer that several have appeared, one particularly in the Quarterly of the Methodist Church South, published at Nashville, Tenn., and another in the Baptist Quarterly published at Cincinnati, Ohio, the latter in return receiving a sound berating from the editor of the *N. Y. Independent* for favorably noticing such a preposterous book, which of course that editor had never read. But we have just now received the *Reformed Quarterly Review*, for July, published at Philadelphia (the old *Mercersburg Review*), one of the ablest of our Church Quarterlies, and which contains the most complete review of the "*Problem*" yet published. It is from the pen of the Rev. John I. Swander, A. M., of Tiffin, Ohio, who has evidently given the subjects discussed in the book special and attentive study before sitting down to his task. Aside from his thorough grasp of the questions discussed, he wields a most trenchant and cultivated pen, carrying along with his shapely paragraphs a gloss and literary finish that indicate the well-read scholar, and a fearlessness in saying what he thinks that is rarely met with in the set papers of our leading quarterlies. The review, as a whole, is so thorough and so full of sharp points, though not in all respects favorable to the book, that we have decided to print it complete in the next number of *The Microcosm*, and thus enable our readers to enjoy the benefits of a great review of a book in which they have shown such a deep interest, without the outlay necessary in sending for an expensive quarterly. They may therefore expect a literary and scientific treat; and while on the whole it flatters the author somewhat, he will be pardoned for enduring the infliction for the good of the cause.

IMMORTALITY.

BY REV. S. A. TAFT, D. D.

A. Wilford Hall:—Your reasoning demonstrates three things to my mind,—(*a*), the substantial nature of man;—(*b*), the heterogeneity of that nature; and (*c*) its absolute indestructibility. But does it demonstrate man's immortality? I confess I do not see it. Indestructibility is not immortality. Nor does the fact of man's indestructibility necessarily involve and imply his immortality. There may be indestructibility without immortality. Immortality is deathlessness. It is exemption entire, and complete from the domain of death. God only hath, necessary inherent immortality. All of His creatures acquire this boon as a special gift and favor from himself. It is a reward, a compensation, a return for obedience and fidelity to God's word and law. Indestructibility is one thing, and immortality is another and quite a different thing. The one is, because man is. The other is, because Jehovah dispenses it. Man is, and therefore he cannot be destroyed. Man has obeyed the gospel—and therefore he is made or constituted immortal.

Death is analysis. It has the effect to separate the material from the immaterial—the physically tangible from the not physically tangible, the outer from the inner man. It compels the man to put off his vestment or clothing; to lay aside the physically tangible part of himself, and stand forth naked and unclothed. This is an abnormal state or condition for man—and has come upon him in consequence of sin. Manifestly the original design or purpose was to constitute man immortal without this painful process. But he fell. He rebelled. He disobeyed God; and therefore God said, "Of dust thou art [the whole put for a part,] and unto dust shalt thou return." Now then until man is exempted from this condition—until he is delivered, and his return to this state made absolutely impossible, he is not and he cannot be immortal. For immortality is deathlessness. It is the negative of mortality. Mortality is death. Immortality is the negative of this, or not-death. And until man passes into the not-death state or condition, he cannot be said to be immortal. And this will not be until after the judgment. He must be raised from the dead. And this will consist in his being reinvested, or clothed upon again with the same or similar vestment or clothing to that he was compelled to lay off. He is now brought into judgment; and if found to be worthy and approved, he is clothed upon with his house which is from heaven, or heavenly in its character. This is his immortalization; and is contemporary with and takes place at the same instant of time with his glorification. Indeed, one aspect of a man's glorification is his immortalization. Immortalized, he is forever delivered from the pains and penalties of death—and comes under them no more forever. Disapproved he (man) is delivered over to death, and death is to prey upon him forever. Mortality or a state and condition of death, becomes his fixed state, and can never be altered. Eternally dying, and yet never absolutely dead. Existence continued, but continued under the sentence of death. Mortality the fixed state forever of the finally impenitent and condemned! Could anything be more fearful!

With this distinction and difference between indestructibility and immortality I have no particular difficulty with your teaching. May be I do not understand you. If so, you can set me right. As the matter now stands, I understand you to use immortality and substantiality as synonyms; or rather perhaps I should say immortality and indestructibility. You say, "Prove the soul to be substantial, beyond the shadow of doubt, and the candid materialist will be logically driven to admit its immortality [indestructibility] as a *reasonable probability*, since it is a universal axiom of science that no substance, however intangible to our senses, can be annihilated." Now I repeat as above, immortality is not indestructibility, and so *vice versa*. True there is no immortality without indestructibility; but there may be indestructibility without immortality. Witness man's present state and condition. He is not immortal, and yet he is positively indestructible. It follows therefore that immortality and indestructibility are not the same. They are different; and this distinction or difference should be carefully kept up and noted by all writers on this important issue.

REMARKS.

Dr. Taft is entirely mistaken as to our views of the immortality of the soul. We do not hold that a thing is necessarily immortal because it is *indestructible*, since, *matter* is indestructible. In the first place we do not deny his definition of *immortality* as far as it goes,—*deathlessness*,—but it does not go far enough. If a mollusk could be made to live forever it would make it *indestructible* as well as *deathless*, but it would be far from *immortal*. We understand immortality to embrace a wider sweep of definition than simple deathlessness. It must signify an endless perpetuity of spiritual consciousness which implies a high order of intelligence as well as deathlessness. God could cause a *tree to live forever*, but as it would be utterly devoid of intelligence as well as spiritual consciousness it would not be immortal. God being a Spirit and the original fountain of all life and intelligence, He only (inherently) hath immortality. All immortality of lower intelligences, and in fact all life as well as mind, are derivative, and are gifts of God. There is no reason, if our definition is correct, why man is not *now immortal*, since he now enjoys life with conscious, spiritual existence. Do you say it must be *endless*, in order to embrace the idea of *immortality?* If so then man never will be immortal because he never will have enjoyed endless spiritual consciousness unless endless can come to an end or be finished. Our spiritual consciousness at the present moment contains the ingredients of *immortality*, derived from God who only hath it to bestow, and just as much as it would contain them if this present life were destined to continue on forever. Now if man's spiritual being or inner man, at death, simply steps out of this physical structure, retaining, as we hold, its personal and spiritual identity and character, it is but a continuation of the same conscious and spiritual life that we possess here, raised to greater perfection or lowered to greater degradation according to real, intrinsic character in this life, since the real man is then brought nakedly to face the real environment of his selfhood without the obscurations of physical surroundings. To say that man is not naturally immortal by virtue of his creation in God's image, and by virtue of his having received a spark from God's self-existent being which constitutes his conscious, spiritual entity, is to say that Adam was not immortal before the fall and that he would

not have continued to be immortal had he never sinned. To be a Christian, redeemed here by Christ, is to be restored to the same immortality that Adam possessed before falling under the condemnation of sin, so far as our spiritual entity is concerned. If that redeemed life continues after the body dies, we do not see why it is not a continuance of man's primeval immortality. That immortality is promised as a gift of God to the righteous is an intimation that the condition of the unrighteous after death by virtue of their real character and degradation, will be so nearly a state of perpetual death as to be virtually the opposite of the higher immortality, though in a modified and limited sense they two will be immortal, since because possessing absolute deathlessness and spiritual consciousness they will never absolutely die. Perfect immortality in its sublimer sense, as the *gift of God*, will only be theirs who are in character Godlike, and in this higher sense life and immortality were first brought to light or revealed to man by the gospel.

Our argument, therefore, for the immortality of man, meaning thereby his perpetual and indestructible existence as a spiritual and conscious entity, is based on the incontrovertible fact that his personal and spiritual entity came originally as a drop from out God's spiritual and vital being. Man as a personal and spiritual entity was not made out of nothing any more than his body was made out of nothing. His spirit, soul, mind, and life as a whole was a drop of God's intelligent, self-conscious being, and as such, shaped into God's image, became the human ego around which forms are reproduced from generation to generation as corresponding physical organisms. The fact that this inner man is *substantial*, demonstrates its *indestructibility*, and the fact that this indestructible entity was originally a part of God, consisting of His vital, mental, and spiritual consciousness, demonstrates man's immortality by science and the nature of things, whether this inner entity be incased in a corporeal body, as at present, or not. If conscious intelligence—*mind, soul*, and *spirit* combined—constitute man as a spiritual yet substantial being, as we claim to have proved in various ways, then his immortality after death is demonstrated by the very fact of his *indestructibility* which science has admitted, since *indestructible self-conscious intelligence*, can be nothing less than *spiritual immortality*.

The lives of lower animals, which do not possess the element of self-conscious personality or spiritual ego, having served their uses in a temporary existence, fall back into the universal fountain of God's vitality and mentality whence derived, and where individual entity or identity ceases to exist, just as a drop of water loses its individuality when reabsorbed in the mother-ocean whence it originally came. This we conceive to be the only rational view of the true line of distinction between the self-conscious and spiritual intelligence of man, and the instinctive intelligence implanted by the Creator in the lower order of animals. This also explains satisfactorily why man shall remain a self-conscious or immortal personality after death, while even the intelligent horse and dog, incapable of grasping the beatitude of a future life, serve out the purposes of their existence here, and, as individuals, cease to exist, though not one atom of the vitality or mentality, of which their earthly being had been constituted, is or can be annihilated. A few of our subscribers, as we just learn, in a town in Minnesota, have refused to continue their subscription to *The Microcosm* because we do not adopt their hobby of "immortality," and contend that at death man's spiritual consciousness ceases to exist until the general resurrection! If this handfull of subscribers are willing to do without *The Microcosm* by allowing that hobby to obscure their vision to all the other discusions of this journal, we will try to endure the loss of their patronage.

THE CHRISTIAN STANDARD AGAIN.

We take great pleasure in copying below the latest fulmination of the "Scientific Editor" of the *Standard*, which has naturally and not unexpectedly degenerated into a personal attack under the true animus of the man, and dictated by the true spirit of spite that actuates him. Our special pleasure in copying this entire article is in showing the readers of that paper what kind of low venom nestles in the office of their once prided journal when a nobler pen and a Christian spirit controlled its columns; for it is evident that the Editor-in-chief is not the author of such suicidal blunders as the one we here copy with our comments:

Had Enough of Him.

[The following coincides with our own inclination. But a public journalist often has duties that are far from savory. If "Wilford" were speaking for himself alone, we should not consider him worthy of attention. But when he vents his crudities in the name of the Christian religion, it is time to puncture his reservoir.—ED.]

EDITOR CHRISTIAN STANDARD—*Dear Sir:* It is the earnest petition of the Christian gentlemen and the fine-souled men of Eastern Tennessee that the Christian papers (and especially the STANDARD, which has ever maintained such a mild, gentlemanly spirit) drop the subject of Wilford Hall. The church's experience with "Wilford" is quite sufficient to have done with him. The fathers of East Tennessee knew this "Wilford" fifteen or twenty years ago as a mean controversial, unchristianly spirited man; with his quackery of Spiritualism and "special influence," which, with "Wilford," met with such a complete demolition under the critical power of Alexander Campbell. These fathers were in hopes that Wilford was undergoing a state of purgation; but after a hide of fifteen years he comes out with the same unchristian, controversial spirit. Let Wilford place his theme upon its own merits and the people will listen to him.

Yours truly,
C. SHELBURNE.

EAST TENNESSEE, July 24.

Now we have only to say that a more outrageous tirade of utter falsehoods than the above contains was never printed in the columns of the meanest political Newspaper; and what is more damning about this unfortunate blunder is, that the Editor of the *Standard* well knows it to be wholly false in letter, spirit, and detail, and without one palliating excuse save the mortal chagrin he feels at his discomfiture in attempting to defend Newton's fixed tangent against our arguments. Utterly beaten at every turn, he now calls to his assistance a cowardly slanderer, who dares not to give his post-office address, and who, to aid the lost cause of the *Standard*, weaves a tissue of charges that has not the semblance of truth or fact for its foundation.

Let us now stamp out these falsehoods by piecemeal.

1st. We were never in the state of Tennessee in our life, nor within hundreds of miles of it, and never knew a man personally who had ever lived in Tennessee! Can it be that this moral assassin in his malicious blindness has mistaken and stabbed the wrong man? But even if this be so there is no such paliating excuse for the *Standard*. 2d. We have never been before the public for a single day in connection with the church or otherwise, nor have we had any public controversy on any subject, for more than thirty years, till the appearance of the *Problem of Human Life*. 3d. We never spoke or wrote a single word or sentence in all our life in favor of "Spiritualism" or "special influence," whatever that may signify; and 4th, we never had one word of controversy with Alexander Campbell upon that or any allied subject, and challenge the record to disprove our statement.

No man knows the absolute truth of our statement better than the senior Editor of the *Standard* who knew us when we were both young men together, and has known our public course since. Yet he allows his mortified subordinate to print these slanderous statements from some irresponsible maligner, who hides himself from the contempt of the world and the indignation of the *Standard* readers somewhere in the mountains of "East Tennessee," without daring to make his address known. Yet, be it known, that the Editor of the *Standard* gives these false statements publicity with his editorial indorsement, knowing them to be maliciously and cruelly without the slightest foundation in truth! Is this the moral "standard" of a great denominational church organ, and will its thousands of Christian subscribers submit still to patronize a journal that can thus resort, in revenge for argumentative defeat, to *wilful falsification and personal slander?* That is the practical question for professed Christians who read that paper to answer.

But if this mode of personal warfare is to be the order of the day, and if the *Standard* is disposed to throw down such a challenge, we will not be long in making the "Scientific Editor" begin again to count his beads and confess to his readers in sackcloth and ashes another stupendous "blunder." We have scores of letters from its subscribers condemning the *Standard* for such uncalled-for personal bitterness toward *The Microcosm* which they have unanimously declared to be doing more to defend Christianity from atheistic attacks, and to overthrow materialistic infidelity than any dozen purely church papers in the land, owing to its undenominational position; and if nothing else can touch the Stockholders of the *Standard* and make them open their eyes, the withdrawal of its subscribers, which is freely threatened if its course is not changed, will be apt to bring them to their senses.

We might quote fifty of these letters now in our possession, and which give no uncertain sound; but we will only extract the following from the letter of a prominent Christian Minister just received, from Chillicothe, Mo., without giving his name at present. But we dare the "Scientific Editor" to deny its authenticity. If he does we will get the writer's permission to publish the letter in full. He says:

"Brother Hall: Inclosed find $10 with 10 subscribers for the Second Volume of *The Microcosm*, as follows:— * * * * * *

"Let me say that I am greatly pleased with your treatment of the *Christian Standard*. I want you to drive the Editor to the wall, and let him know that there is somebody else in the world besides Isaac Errett. I have known him long, and he needs it piled on thick and fast. His *Catholic son* Russell (the 'Scientific Editor') is in great need of something for his health."

This will do for the present, with the simple suggestion that if the *Standard* wants a *personal* encounter with *The Microcosm* let its Editor invite our batteries by another such libellous article, and we will accommodate him with something more definite than a "fine-souled" *crank* hailing from "East Tennessee"!

KIND WORDS.

Rev. Prof. Higgins, Clinton, Mo., writes:—

Wilford Hall, Dear Sir:—

I have just finished reading the first volume of *The Microcosm*. I have also studiously read the *Problem of Human Life*, and I cannot longer refrain from thanking you for the human race in so successfully defending religion against the doctrines of the atheistic and materialistic schools, and for so manfully standing alone, as it were, in the defence of true science against the arrogant assumptions and fabricated experiments of would-be philosophers. God bless you in your noble work, and give you yet many years in which to battle for the truth. *The Microcosm* is all it should be,—a perfect gem of a journal,—and welcome to my office as no other paper ever was. The '*Problem*' is truly the Book of the Age. Ten years ago I was in active pastoral work, and would have given a hundred times its price could I then have had it. I am now and have been for ten years a teacher of acoustics, and I am almost ashamed to say that until recently I have taught the wave-theory of sound, never giving it a thought as to any doubt of its correctness. *But I do not teach it now.* I remain, very faithfully yours, R. K. Higgins."

Eld. H. W. B. Myrick, Gentryville, Mo., writes:—

"I certainly wish your *Microcosm* great and deserved success. I consider it, in view of your new and important departures in science and philosophy, the greatest foe of infidelity and materialism known to literature, and the crown of blessing to the religious world. Believe me to speak feelingly upon this matter, for I have stood

within the dark shadows of atheism and can appreciate the glorious light of truth."

Rev. Dr. Vaughan, our esteemed contributor at Manassas, Va., writes:—

"I think I am justified in the opinion that *The Microcosm* has done more good in Virginia that any religious denominational paper has ever done in twice the time."

Mr. H. N. Thomson, Waterville, N. Y., writes:—

"The more I read the *Problem of Human Life*, and meditate upon the great truths therein brought to light, the more I thank God for life here and the glorious prospect of life hereafter. Never before from the pulpit or any other source have I heard one tangible, thinkable or rational idea of what the human soul really was. Now all is clear to my mind. Now I have attained a solid ground for my faith to rest upon, and O, how thankful I am that I have lived to see this day, and to enjoy such an intellectual feast before going hence. I send you my $1 for the second volume of *The Microcosm*, and would do so if it were $5 instead, such is my appreciation of your fearless and noble journal. My prayer is that your second campaign in this war against false science and materialism may be more successful, and a grander triumph than the first. May you be preserved in all your vigor of mind and body till you have seen the enemy routed at every point and the crusaders for the cause of truth everywhere triumphant.

Very cordially yours, H. N. Thomson.

Wm. A. Dallas, Green Springs, O., writes:—

"I hope you will pardon this intrusion upon your valuable time. My only excuse is that I am so deeply interested in you and in the '*Problem of Human Life*,' and in your *Microcosm*, that I can no longer restrain myself from expressing to you my sincere belief that your book, next to the Bible, is the most important work of the nineteenth century. I fairly revel in its grand and unanswerable arguments. May you be long spared with health and the use of your powers to carry forward this good work, is my sincere prayer."

Rev. Mr. Glover, Amityville, N. Y., writes:—

"I wish to say I have about all of Scott's and Dicken's works, and many works on metaphysics of which I have been fond, but I do not remember anything that has so fascinated me as the *Problem of Human Life*. I shall soon commence the re-reading of it, and shall not allow myself to be charmed onward at so rapid a pace. The positions you take are of *immeasurable* importance. They are strongly put, and are sustained with a force and originality to me refreshing. The strength of the work is marvelous. You have clearly a call from God to 'go forward,' and God bless you. Yours truly, H. C. Glover, Pastor M. E. Ch."

Rev. James M. Follett, Presque Isle, Me., writes:—

"I am a student of the *Problem of Human Life*, and an interested reader of *The Microcosm*. The value of both book and paper can never be expressed in dollars and cents, nor in any of the perishable riches of this earth. The truths set forth in them will endure forever, and the influence they are exerting is for eternity. God will bless and reward the author. I inclose $2 for a copy of the '*Problem*' for Mrs. M. E. Richardson."

Dr. O. F. Baxter, Norfolk, Va., writes:—

"I have been reading the *Problem of Human Life*, and it has opened up to me a much clearer view of life here and hereafter than I ever had before, or ever expected to comprehend. I now see things in quite a different light from heretofore. Darwin, Huxley, and Hæckel have been completely estopped, and to circulate their atheistic writings where the '*Problem*' is read, will be to incur the ridicule and laughter of intelligent men."

Geo. H. Hadley. Hope Valley, R. I., writes:—

"I received *The Microcosm*, back numbers. Words fail me in expressing my delight consequent on their perusal. I truly hope that every thinking person from Maine to California will yet take it, for I believe that it will give them a richer intellectual repast than any other paper in the United States."

A NEW PHILOSOPHY—SUBSTANTIALISM.

We have received an Oration, with the above title, delivered at the Commencement of Cornell College, Mt. Vernon, Iowa, by Mr. T. Linus Blank, one of the students. It is gleaned from the various discussions in *The Problem of Human Life*, and very forcibly condensed, containing a valuable synopsis of the views of the author on that phase of philosophy. We expect to print it in the next number of *The Microcosm*. We learn that Mr. Blank has fearlessly bearded the Professors of Physics in that College on the wave-theory of Sound and that other students are taking up the war-cry against the rediculous fallacy so long taught as the true theory of acoustics. The Professors, it seems, do not take to it kindly, but such is to be expected in most cases. We do not expect men whose minds have long been accustomed to running in the deeply worn grooves of a scientific theory, however false, to force themselves out at once, unless they possess uncommon stamina and mental independence, and that is not the case with the majority of professors. We would say to the students of Cornell and other colleges, stand fast for true science on this question of sound, and you will in time compel Professors of Physics to open their eyes.

TO OUR CONTRIBUTORS.

Several of our contributors are in the habit of using Greek and Hebrew letters in quoting words from those languages. Why not simply substitute English letters and leave out the characters of those dead languages which few of our readers, comparatively, understand? "Copy" thus written will be much more acceptable to our compositors, and much less liable to involve errors.

☞ We are pleased to introduce to the readers of *The Microcosm*, our new contributor, Prof. W. H. Slingerland, Professor of Physics in Hedding College, at Abingdon, Ill., whose able article on the Relation of Science to Religion appears on the first page of this paper. We published a letter from him in the April number in which he unequivocally admits that the wave-theory of sound has been overthrown by the arguments published in the *Problem of Human Life*. In view of the indorsement of such men, who have taught the old theory of sound for years, we can afford to smile at the pitiful slaps of the impenetrable who has editorial charge of the N. Y. *Independent*, and who confesses to his shame that he condemns the book without having read it.—Editor.

MICROCOSMIC DEBRIS.

A handsome monument is being erected by military subscription to Prince Louis Napoleon opposite the Royal Military Academy in Woolwich, where he was for some time a student.

Tennyson sees no one without an appointment, especially in the American tourist season, when he retreats from the Isle of Wight to a secluded nook of Hampshire.

Albert Morris and Jennie Adams were airily married in the clouds over Topeka, Kansas; but the balloon landed them in a forest, and they had to make a honeymoon pedestrian journey of ten miles to get back into civilization.

The Rev. John Jasper of Richmond says that a boy in his congregation has been struck dumb for telling lies. With this awful warning before him, he dares not stop preaching the truth about the flat earth standing still and the sun revolving round it.

During 1881 there were in Alexandria 8,075 deaths, being 38 per 1,000 of population. Among the resident foreigners the rate was 43.76 per 1,000. Both rates are very high. The last census showed the whole population to be 212,034, of whom 164,718 were Egyptians and 47,316 foreigners.

It is to be hoped that Burns' pauper descendants are properly appreciative of the bust to his memory which is to be placed in Westminster Abbey, but the occasion might be a good one to take up a subscription to get them a few comforts in the workhouse.

Dr. Nicholas N. De Menil was one of the oldest and most successful medical men in St. Louis. Yet, when taken seriously ill, he said he would die on July 10, as he was convinced he could not survive a change of the moon. The physcians in attendance wondered at his superstition, and wondered again when he died the 10th.

An ingenous Strasburg dentist lately extracted a molar, and finding it sound with the exception of the joints of the root, he sawed them off, filled the cavity with gold, and replaced it. It has reestablished itself, and is now said to be doing business at the old stand in a most satisfactory manner.

A silk company has begun business at Aberdeen, Miss. The manager, an expert, thinks the Southern States possess a better climate for the successful, profitable cultivation of silk than any other part of the world in which the cultivation of silk is carried on. The climate is most like that of Japan, but better.

St. Paul's Episcopal Cathedral, in Indianapolis, being wrecked by a wind storm, a Hebrew congregation proffered their synagogue for use on Sunday. Other arrangements had already been made: but the exchange of letters on the subject was exceedingly cordial, the reply from the church being written by the Hon. Thomas A. Hendricks, warden.

Five important Moscow firms have formed a syndicate for the promotion of cotton cultivation in Central Asia, and for the introduction of Russian cotton fabrics into Central Asia and into Russia generally. The syndicate proposes to engage American experts in order to improve the system of cultivation. The statutes of the syndicate have already been approved by the Ministry of France.

It is remarkable that misers generally are long lived. Many years ago Samuel Bailey, a farmer in the Isle of Wight, subjected himself and family to incredible privations. In order to save feed for horses they even did the ploughing and harrowing themselves, and would eat the flesh of animals which had died a natural death. Yet he lived to be 92.

The male inhabitants of New South Wales appear to be in a sad condition. A great number of them find it to be physically impossible to procure wives. According to a report recently issued on the population of that colony, no less than 79.000 women are required to equalize the sexes. The other Australian colonies require about the same number in proportion to their population.

A peculiar system of mortgaging farms is used in Switzerland. A farmer may borrow of a dozen men successively, the simple record in an official book showing their order. If he fails to pay, a successor is found for him by beginning at the bottom of the list of debtors, and calling on each in his order to assume all the debts and manage the farm or step aside and lose his claim.

Five adventurous young men have gone from San Francisco on an expedition into the unexplored eastern part of Alaska. They expect to find mineral wealth, and are prepared to spend five years in the search. They will go up the Yukon River 1,500 miles in a chartered vessel, and then, in a steam launch of their own, try to penetrate 1,200 miles further into the mountainous region.

There seems to be more or less trouble with public water works all over the world. A report just made to the municipal authorities of St. Petersburg recites that "the water is obtained from near the banks without any precaution being adopted for preventing the entrance of filth into the basin, and that at times the action of the pumps is impeded by drowned animals." Mortality returns in St. Petersburg show large death rates.

A French photographer claims the authorship of an invention that will take accurate impressions of the motions of a bird in full flight, which is a long advance on photographing a galloping horse. Twelve pictures are taken by this process in a second, of which less than one-fiftieth is used in the actual reception of impressions. The rest is spent in the movement of the hand which turns the instrument to bring the several plates into operation.

The Rev. Joseph Cook's wife has arrived in New Haven from a tour around the world. She left her husband in India, trying to prevent the people from accepting the skepticism of western Europe. She says that they are familiar with the writings of Herbert Spencer, Mill, Tyndall, and Huxley. "The lecturer combatted this tide of unbelief and agnosticism, and the Brahmins heard his denunciation of caste without demonstrations of disapproval." Mrs. Cook resents the suggestion that they did not understand it.

One of the most eminent of German medical men is reported as saying that there are not less, probably, than 10,000 persons in Germany who have become slaves to the habit of hypodermically injecting morphine. There are many who take as much as eighteen injections every day. Some have hardly a square inch of skin on their bodies which is not marked by scars produced by this practice. Slaves of this habit are even more hopelessly enchained than those who take opium in other ways, and it is speedier destruction.

The *British Medical Journal* says that a castor-oil plant was placed accidentally in a room swarming with flies, but almost immediately the flies disappeared, and flies were found under the plant, or clinging to its leaves, dead. The leaves are said to give out a property deadly to insects. Who knows but that the mosquito, too, may succumb to castor-oil, and that New Jersey and Staten Island may yet enjoy life, even in the dog-days?

Eight clergymen preached simultaneously in the Eastern Penitentiary, Philadelphia, last Sunday, to invisible audiences. This prison is conducted on the principle of solitary confinement. Each prisoner has his own lonely cell. These cells open on eight corridors, radiating from an octagonal centre. The preachers stood at the outer ends of the corridors, and could be heard by the occupants of the cells in their several sections. A group of officials and reporters in the middle of the prison experienced the sensation of listening to eight sermons at once.

The practicability of running cheap cabs is shown in Hartford, where hackmen are prohibited by law from charging more than twenty-five cents for each person within an area measuring about two miles across. Formerly the charges were double this or more, but the amount of cab-riding has increased to such an extent that the hackmen make more money, or can if they wish to, than they did before. Many persons ride in cabs now who never thought of doing it formerly.

A street urchin was captured the other day, in this city with a basket half full of old cigar stumps, which he had picked out of the gutters. To a police court justice he said he sold them for ten cents a pound to a maker of cigarettes, and that a good many boys and girls were engaged in this industry. Yet even this explanation, and a knowledge of how bad some cigars are, will not fully account for the vile odor of the average cigarette smoked on the platforms of street cars.

Noah Orr, familiar in museums for about thirty years as a giant, is prostrated by paralysis at Marysville, Ohio, and is not expected to recover. Last winter he weighed 530 pounds, being very corpulent, though his height of nearly seven feet and a half served to keep him in tolerable proportion. Since then he has lost 200 pounds. Orr has three brothers, ranging from six feet five inches to seven feet, and a son, who at 15 years of age measured nearly six feet.

The travelling show business has received a serious blow from Western railroad manages who have combined to raise the prices of transportation for performers and their baggage. Heretofore the charge for such passengers has been about half the regular rates, with no limit as to free baggage, and deadheads numerous. Hereafter a uniform tariff of two cents a mile will be enforced with only a 100-pound trunk included for each person, and no tickets given to anybody.

A woman of Stockton, Cal., believing that she was about to die, confessed to her husband that she did not love him, but had centered her affections on a neighbor. She declared that she could not die unforgiven, and so the husband freely forgave her. But he granted the favor only in view of her speedy death, and, when she unexpectedly recovered, he began a suit for divorce. Her defence is that he condoned her fault by the forgiveness, and a peculiar question of law is raised.

In Naples a kind of wife market is held in connection with the foundling hospital every year. All the marriageable girls of the institution assemble in a room, to which young men of good character have access. Offer of marriage on the part of any young man is conveyed by allowing his handkerchief to drop before the object of his choice as he passes by. If the girl takes it up, she thereby signifies her acceptance, but her refusal if she allows it to remain.

Arabi Pasha would be recognized at once by the ethnologist as the soldier son of the Egyptian peasant. He is tall and muscular. His eyes are small and dull, not bright and sparkling as little eyes are wont to be. The lower part of the visage resembles that of the bulldog, with broad jaw and hanging cheeks. The nose is wide and flat, of true African shape. He was brought up at the military school established by Col. Selnes, and his education was entirely French. Consequently he hates the French, but detests the English still more, and most of all the Turks.

In London there is soon to take place a great auction of old fans of rare workmanship and great value. Among them are Marie Antoinette's marriage fan, and others designed in commemoration of her betrothal to the Dauphin; the bridal fan of Maria Leckynska, wife of Louis XV., and so forth. The collection is divided under the heads, "English period of George III.," George II. period, and anterior; fans made in China for English marriages, and other souvenirs; early engraved fans, Charles II. period; Flemish, Chinese, Italian, Venetian, French modern, empire, consulate, and revolutionary periods, and periods of Louis XIII., XIV., XV., and XVI.

Vanadium, discovered in 1801 by Del Rio, existed up to 1867 as one of the rarest of chemical curiosities. At that time a Rouen calico printer made some experiments with it, and found it so superior to the sulphide of copper that it grew into demand. But vanadium was so difficult to obtain that even in 1867 its compounds, containing but 50 per cent. of the metal, were equal to the price of gold. Within the past year, however, large quantities were found in France, in alkaline earths, and the supply is supposed to be adequate to all demands. This is a striking instance of the unexpected practical value often found in products originally supposed to be of interest only to theoretical chemists.

The students of the University of Vienna have given an ovation to Prof. Billroth, the surgeon, because he declined an invitation to take the place of his teacher, Prof. Langenbeck, in Berlin. In the morning an address was presented to him in the hall of the Academy of Sciences. In the evening a great torchlight serenade was held. Thousands of students, with torches and colored lamps, marched with the old University flag and a band of music to the Professor's house, where the old German student's song, "Gaudeamus igitur," was sung, and after a hymn composed for the occasion.

A painting lately uncovered in Pompeii seemed identical in subject with the judgment of Solomon. In the centre is a bench with three judges; kneeling at their feet, in an attitude of prayer, is a woman; further toward the foreground is a butcher table, and upon it is a naked babe, which a man is preparing to kill with a large knife, while beside him stands a second woman with an indifferent air. Soldiers and people enclose the scene.

SOUND INTERFERENCE.

One of the most demonstrable fallacies of the current theory of sound consists in its pretended law of *interference* of sound-waves by which as claimed the *rarefactions* of one set of air-waves coalesce with the *condensations* of another set, and thus mutually destroy each other, producing silence. This law is exhaustively examined and answered in the *Problem of Human Life*, to which no reply has been received or may be expected from those great acousticians reviewed in that book. To show the reader that the arguments there presented against the wave-theory are entitled to respect rather than silent contempt, we present the following letter from Capt. Carter, Professor of higher mathematics at the Military Academy, Chester Pa., which speaks for itself. Next month we will give an unanswerable argument from Capt. Carter's pen against this same law of interference:—

Dear Dr. Hall:

In the *Problem of Human Life* you dissect Tyndall's and Helmholtz's experiments with the double siren, showing that when the two perforated plates are set so that the puffs of air through each exactly coincide, we hear a strong fundamental note; and when the plates are set so that the puffs occur alternately, we have not silence as claimed by the theory of interference but double the number of puffs or vibrations, and therefore, of course, the octave of the fundamental. You also make the practical suggestion that a third plate be added and arranged to puff alternately with the other two, thus trebling the number of puffs and consequently the number of vibrations, when you predict that the fifth above the octave will be heard without a trace of either that octave or the fundamental tone. You argue that if the three sets of holes were all bored in the same plate, there could be no question that the fifth above the octave would be the result; and then you ask what difference should there be if these puffs come from separate plates very close together, provided they succeed in the proper order. The special point to which I wish to direct attention is your claim that these succession puffs, *coming from different points, would concur in the formation of the same sound* and not "interfere" as claimed by Tyndall and Helmholtz.

Now there is in existence a fine instrument known as the Grand Siren of Seebeck, which has seven plates instead of only three, as you suggest. It can be seen at any large establishment, such as Jas. Queen & Co., of Philadelphia. It was manufactured and known long before your book appeared, and it is actually designed to prove the very point you make. In the descriptive catalogue of Queen & Co., each of the seven disks is described, and the office of one is given thus: "*The fifth disk shows that impulses coming from different points can concur in the formatiou of the same sound.*"

Here is a conviction out of their own mouths. Your argument is as clear as noonday, but it is not unwelcome to find that the very men who thought the plates of the double siren interfered," had full knowledge of another instrument which showed that the "interfering" puffs coalesced in the same sound. Let the Grand Siren come to the front and sing its song.

Most truly yours,
R. KELSO CARTER.

The following extract from the *Problem of Human Life*, beginning at page 293, gives a part of the argument against the explanation of Tyndall and Helmholtz, as referred to by Prof. Carter, and may interest our readers:—

"Look for a moment at the language of Professor Helmholtz, and note the family resemblance between it and that of Professor Tyndall:—

"The puffs of air in one box occur exactly in the middle between those of the other, and *the two prime tones mutually destroy each other*. . . . Hence, in the new position *the tone is weaker*, because it is deprived of several of its partials [over-tones]; but it does not entirely cease; *it rather jumps up an octave.*"—*Sensations of Tone*, p. 246.

It seeems that Professor Helmholtz even sets the example of *self-contradiction;* for how in the name of reason, can "*the two prime tones mutually destroy each other*," when they *do not entirely cease but rather jump up an octave?* If a man jumps up on the top of a fence, he is not *destroyed*, or *neutralized*, or *obliterated*, in any sense whatever. He has only exchanged a lower for a higher position! So the two fundamental unison tones of the two disks, caused by 12 puffs to the revolution, simply combine in one tone of 24 puffs to the revolution, which lifts it to a higher position in the musical scale, or, as Professor Helmholtz plainly puts it, the tone "jumps up an octave," without involving any such thing as mutual destruction or neutralization.

The reason why "the tone is *weaker*" in the "new position" seems to be a profound mystery to this eminent investigator, save on the supposition that it consists of the first or principal *over-tone* ("deprived of several of its partials"), which is always too weak to be distinctly heard by the unaided ear while the prime tone is being sounded. It of course never occurred to this standard authority on Sound that the reason why the octave was "weaker" was simply because it was constituted of a *single* series of 24 successive puffs or vibrations to a revolution, while the prime tone was composed of two series of 12 *double* or *unison* puffs which necessarily reenforced each other, and by which means their intensity was increased *fourfold*, as already quoted from Professor Tyndall. The "weaker" character of this *octave* is thus beautifully accounted for according to my explanation of the *double siren*, and would have been easily comprehended by Professor Helmholtz but for his pet brood of *over-tones* which he was just nursing into life, and on which account he pressed into service the assistance of this "highly composite" *siren* as a kind of foster-mother. But he will learn when he reads this review, if not before, that she has at last discarded the whole family as too conspicuously illegitimate and outlandishly ungeneric for even foster-children.

I now propose to Professor Helmholtz, with all deference and respect, and through him to the scientific world, a simple practical test of this whole problem, by which to demonstrate either the truth or falsity of my explanation of the *double siren*, and which will also and equally demonstrate the truth or falsity of his own solu-

tion, since one or the other of our explanations must necessarily fall to the ground.

Suppose, instead of a *double siren*, such as already described, having *two* disks, we construct a *triple siren*, having *three* disks, each disk containing a circle of 12 orifices and supplied with wind by a separate pipe, all three being secured one above another to the same rotating spindle. It is evident, if the pipes leading to the three circles of orifices should be so adjusted that when the spindle rotates the three disks shall puff simultaneously that they will unitedly make only 12 puffs to the revolution of the spindle, and hence the fundamental tone will be an intense triple unison.

Let us now suppose that the spindle makes exactly 11 revolutions in a second, producing 132 puffs, or the precise number necessary to generate the fundamental note C, with the three disks puffing simultaneously, and consequently all sounding the same note in unison. According to the explanation of Professor Helmholtz, the disks are not only sounding this prime C, but they are also faintly sounding several over-tones of different degrees of pitch, though they are not distinctly heard, owing to the loudness of the prime note. The first or principal over-tone, in point of intensity, he tells us, is C 1, exactly an octave above the prime, and that it was this over-tone, "deprived of several of its partials," which was heard as the *octave* in the experiment with the *double siren* when the two prime unisons were mutually destroyed by "interference."

As we now have three disks of 12 holes each instead of two, we can easily make them all "interfere" by so adjusting their pipes as to make them puff in regular succession one after another, with the intervals equidistant apart, thus producing 36 consecutive puffs to each revolution of the spindle. Supposing the rotation to continue at the same uniform speed after the pipes are thus shifted, it is manifest that 36 successive puffs will occur in the time of 12 puffs before the change. What, then, must take place? I here announce to the physicists of Europe and America—and earnestly request these high authorities on Sound to show that I am mistaken—that not only will the prime C vanish from the sound, but the octave C 1 will also not be heard at all; and that instead of C 1, which was alone heard issuing from the *double siren* (being in that case the proper tone for the 24 puffs produced at each revolution), we will only hear from the *triple siren* the note G 1, or the fifth above the octave C 1, being the exact note corresponding to 36 puffs to the revolution under that uniform speed of rotation.

Will Professor Helmholtz accept the proposition here made, and join the writer in carrying out this test, by means of a *triple siren*, that the scientific public may know what to depend on? If he is as frank and candid a physicist and investigator of science as there is every reason to suppose him to be from his writings, he surely will not feel at liberty to refuse aiding in this conclusive solution of not only the action of the *double siren*, but also of the truth or falsity of this so-called law of "interference," as well as of the entire wave-theory of sound, since they all necessarily stand or fall together.

If this advanced scientist should deem the suggestion here made worthy of his attention, and if, on making this experiment should find that the fundamental note C entirely vanishes as soon as the pipes are shifted so as to make 36 successive puffs to the revolution, he at once destroys this law of "interference" based on *half* wave-lengths and the coalescence of condensations with rarefactions, since in such a case as this it is only *third* wave-lengths, the pipes being shifted to speak at a third of an interval each from one fundamental puff to another.

Then, again, if he shall find that not only the prime C, but the octave C 1, is silenced, what, pray has become of his first *over-tone*, which made all the music heard coming from the double siren after the two disks were placed in a phase of opposition? The three disks, when puffing simultaneously and producing the triple unison fundamental C, surely were sounding also their first partial or over-tone C 1, according to Professor Helmholtz! What then, has become of these three unison first over-tones if they are not heard, which they will not be if my prediction is correct? They should be heard even louder than from the *double siren* after the shift takes place, having one additional re-enforcement.

Finally, if the only tone heard, after this so-called "interference," shall turn out to be G 1, a fifth above the octave C 1, and the very pitch of tone requiring the 36 vibrations to the revolution, as every physicist will admit, is there a scientific thinker on earth who would not at once decide that the explanation here given of the *double siren* as the cause of its *jumping up an octave* is the correct one, and that neither Professor Helmholtz nor Professor Tyndall understood the instrument they were exhibiting to the public or its accoustical effects?

As an evidence that this is a correct exposition of the problem, any acoustician will readily admit if the three disks should be perforated each with a circle of orifices in the following order—the lower one with 12, the middle one with 24, and the upper one with 36 holes, that when sounding together they would produce the chord C, C 1, G 1, if rotating with 11 revolutions to a second; whereas, if the lower and middle disks should be suddenly stopped off and silenced while thus revolving, the upper disk, with 36 orifices, would go on sounding G 1 precisely the same and producing the same intensity of tone as would the three disks if perforated with 12 holes each and if so adjusted as to puff in succession, as already described. It would be a singularly suggestive fact, to say the least, if this explanation, given by a writer who has never seen a *double siren*, should turn out to be the correct one, in opposition to the opinions of the greatest sound investigators of the age!

In conclusion, on this subject, I would say that I am entirely willing that the discussion shall end with the single experiment here suggested, and I feel sure that the intelligent reader will not hesitate to admit its extreme fairness as well as the conclusive character of such a crucial test as the one proposed of a *triple siren*."

STRING VIBRATION.

In the June *Microcosm* we printed a letter from Rev. Mr. Wells, setting forth what we then regarded as a "new law of string vibration," namely, that the tensioned string when drawn to one side and released starts back, not like the pendulum, slowly at first and then faster to the centre of the swing, but swiftest at first, then slower and slower to the other extreme limit (See Mr. Well's article). Now we think, after careful reflection, that the argument as stated by Mr. Wells needs modifying slightly. We admit

that the greatest strain is exerted upon the string when at its extreme limit, and that it should and would have the swiftest motion at the start of its return if nothing but the force of tension should act upon it. But we find that Mr. Wells left out the *momentum* or *inertia* of the string acquired and accumulated from its start back till it reaches the centre and from the centre to the other limit of the swing. If nothing but the tensional force of the string were involved, the string would manifestly stop stock still when it reaches the centre. But the acquired motion is what carries it beyond the centre. How much this acquired motion modifies the supposed law in string vibration, or causes it to vary from that of the pendulum, we are not yet prepared to say. That there is a decided difference in the two cases is plain, since the pendulum is constantly under the influence of a uniform force,—gravity,—its increase of velocity depending upon acquired momentum and the angle at which gravity acts upon the ball. It will be a very nice problem in physics to determine accurately the exact difference in the ratio of increase in the two classes of motion.

THE GRAVITATION CONTROVERSY.

In the next issue of *The Microcosm* we purpose giving our readers a startling example of philosophical oversight on the part of Sir Isaac Newton, as well as on the part of all mathematicians and astronomers since his time. We will show in that example an error more glaring and surprising even than the one already pointed out of supposing, as did Newton, that the 16 feet fall of a heavy body at the earth's surface was the effect of gravity alone. The oversight thus alluded to, like the one just named, relates to the fall of the moon from its tangent, and of itself completely breaks down that famous moon-demonstration which was the chief cause of the immortalization of its author.

In a private letter some time ago Prof. Goodenow admitted that if Newton's demonstration of the moon's fall from its tangent, and its relation to a stone's fall at the earth's surface, were wrong then all was wrong as regards this law of gravitation, and expressed his willingness to narrow the entire controversy down to this single question of the moon's fall from its tangent, yet in his very next article, as published in the August number, he was compelled to admit that Newton was mistaken, and that his formula, upon which his demonstration was based, was "not exactly the correct method" but was "only a rough measurement!" The disclosure we now promise will add to the *roughness* of that "measurement" by showing so plainly that a child can comprehend it that it was *no measurement* at all, and that Newton's "method" leaves out a factor in the calculation which when duly considered, converts the entire so-called "demonstration" into a laughable scientific farce. So let Professors Goodenow and Hornung, and especially the Scientific Editor of the *Standard* prepare to laugh as well as to be laughed at, since their own attempts to aid Newton's law break down by the same disclosure and process of reasoning.

By the way, why does not the Scientific Editor come out with his promised explanation of the moon's fall from the tangent? We are becoming as excited over this prospect of a scientific show as is the little boy when he first comes in sight of the big circus tents! Our pen fairly perspires to begin the dissection. Our readers too, are becoming impatient and are writing us, anxiously asking if we can tell what is wrong at the *Standard* Office. We confess that we cannot, unless the young scientist has seen the "truer demonstration" of Prof. Goodenow in last month's *Microcosm* and the Editor's reply, and has concluded that he has "*Got Enough of Him*!"

The able and widely circulated *American Christian Review*, of Cincinnati, and of the same denomination with the *Standard*, copies its libellous article as given elsewhere in this paper, and remarks:—

"You will observe the *Standard's* editor agrees with his correspondent, and says briefly that he has had enough of Wilford Hall. He has had but little to do with Wilford Hall, and in that little, has had an experience of which he avoids a repetition. As he says in his commendatory notice of Wilford and his *Problem of Human Life*, the scientists have caught a "Tartar." So this editor finds he too has caught a Tartar in his attempt to upset Wilford's exposure of Newton's Scientific reasoning, and now declines any farther notice of Wilford. * * * * * A poor excuse is better than none with which to get out of an unequal controversy upon a scientific subject. Wilford is a hard road to travel, of which many of the scientific gentlemen of the country have had actual knowledge."

Just as we go to press the *Standard* comes to us again containing a contribution from another volunteer assistant against that terrible "Wilford," in the person of one "Prof. C. J. Kemper," who makes a most sorrowful and self-contradictory attempt at reply to our July answer to the *Standard*,—a mixture of Goodenow, Newton, and Hornung. In that answer as the reader will recollect, we made reference to the criticisms of one "K," as a *Standard* assistant, who, as we suspected, was afraid to sign his name. Not to be thus taunted, he now says his "name in full" is "Prof. C. J. Kemper!" But, strange to say, he forgets this time to tell where he lives! But for that we might help him out of his bewilderment by sending him documents. But he positively gives no clue to his post-office address.

We strongly suspect therefore that this "Prof. C. J. Kemper" is a *myth;* or possibly he may be a private partner of that other "fine-souled" Christian gentleman definitely residing in "East Tennessee!" This "name in full" should recollect that there are a great many post-offices in this country and that there are possibly several if not more C. J. Kempers, some even with "Prof." as a part of their "name in full." His sudden recollection of giving his name, while strangely forgetting to tell where he lives, reminds us of an incident in the life of the English poet *Savage*. On visiting his sister, some distance from London, he was constantly in the habit of forgetting the key to his valise, causing considerable annoyance to his sister when she wished to improve his naturally slouchy appearance by a change of his toilet. At last he received a good scolding for his absent-mindedness, and on his next visit, smarting under its recollection, the first thing he did on entering the room was to hold out the key, saying "There; I did not forget it this time!" "But where's your *valise?*" asked his sister. "By George," said the poet, "I forgot that!"

Whenever "K" will bring his carpet-bag as well as his key we will attend to him if he is worth attending to, and we promise to show to the satisfaction of any competent person that he has in that single article surrendered the entire controversy into the hands of *The Microcosm*.

WILFORD'S MICROCOSM.

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THE RECIPROCAL INFLUENCE OF THE MIND AND THE BODY.

BY J. W. LOWBER, M. A., PH. D.

"Influence of the Mind upon the Body. There is not a natural action in the Body, whether involuntary or voluntary, that may not be influenced by the peculiar state of the mind at the time.—JOHN HUNTER."

The mind is a conscious organism, which can exist independent of the body; but its influence over the body is very great, because the body is simply an organism through which the mind manifests itself. The connection of the mind with the body is so close, that it is difficult to tell where it commences and where it ends. The extent and nature of this connection can only be known by the same kind of observation and reasoning by which we become acquainted with the outer world. We can see their form only as we see the form of things in the external world; but we can not feel, nor can we see their structure. We can only arrive at it by obscure and difficult research. The most distant objects in the universe are more accessible to our observation, and in many respects more intelligible to our understanding, than the material house in which we live. There is a tendency on the part of man to look beyond self, and fail to know himself. We presume to scan the whole universe of outward being, before we spend much time in studying self closely and systematically. Man discovered the movements of the planets long before he discovered the circulation of his own blood. Yet the current of the blood is so much a part of himself, that when it stops the thoughts cease.

The relation of the mind to the body appears to be the closest in those mental operations in which no apparent movements of the body are concerned. In the exercise of pure reasoning, the mind appears to act almost independent of the body, by an effort of the will we direct our attention to new objects, and almost in the twinkling of an eye, we pursue new trains of thought. In the direction of our affections toward those whom we love, we also appear quite free from material mechanism.

The mind controls all parts of the body which are under the influence of the will. When we walk, talk, touch the strings of a guitar, or the keys of a piano, it is done primarily by the act of the mind displaying itself through the bodily organs. As the mind has such influence over the body in health; we must, also, conclude that it greatly influences it in disease. A person may be very hungry, receive a sad message, and be unable to eat at all. It is the influence of the mind over the bodily organs, that for a time suspends the appetite. I knew a young lady, who was almost a complete invalid, and as soon as she became a Christian, her health returned. We did not consider it miraculous, nor did she have to visit a modern faith-cure establishment. The great London physician was entirely scientific, when he told the young French nobleman that Jesus Christ was the physician whom he needed. The young man's mind was disturbed about eternity, and this affected his body; so when he accepted Jesus, the Great Physician, he was healed.

It is admitted by all that excessive mental labor is opposed to the cure of nervous diseases. Dr. Bennett, of Scotland, claims that predominant ideas make their impress upon the body in disease. If that be true, all ideas have their effects upon the body and upon the character of man. A man is, as he thinks. The Bible is scientific in its claims,, that man will be judged for his thoughts as well as for his words and deeds. It is so important that we control our thoughts, when we remember that every bad thought makes an impression upon our very being that it may be very difficult ever to have erased. Every good thought is a step in the direction of Heaven.

LANCASTER, KY.

[To be Continued.]

THE GOLDEN AGE.

BY ELD. O. H. TRUMAN.

The Golden Age has been the theme of prophets, the dream of poets, and the bright anticipation of downtrodden man in most ages of the world.

The past has not seen it, the present does not possess it; will it exist in the future?

I. SCRIPTURE TESTIMONY.—"And he [the Lord] shall judge among the nations, and shall rebuke many people: and they shall beat their swords into ploughshares, and their spears into pruning-hooks: nation shall not lift up sword against nation, neither shall they learn war any more."—Is. 2: 4.

"They shall not hurt nor destroy in all my holy mountain: for the earth shall be full of the knowledge of the Lord, as the waters cover the sea."—Is. 11: 9.

1. This *peace* shall result from Christ's government.

"And there was given him [Christ] dominion, and glory, and a kingdom, that all people, nations, and languages should serve him."—DAN. 7: 14.

"And the seventh angel sounded; and there were great voices in heaven, saying, The kingdoms of this world are become the kingdoms of our Lord, and of his Christ; and he shall reign forever and ever."—REV. 11: 15.

2. It will last a thousand years; hence, is called the Millennium.

"And he laid hold on the dragon, that old serpent, which is the Devil, and Satan, and bound him a thousand years."—REV. 20: 2.

II. TESTIMONY OF NATURE.—Geology shows development in the earth's crust; paleontology shows development in the creation of plants and animals, and history shows development in man's condition since the fall. Since progress is a law of our being, may we not expect it to continue until we reach the *Golden Age?*

I. IS IT NEAR AT HAND?—God reveals in His Word the following events in the order named:

1. The Christian conquest; 2. The Apostasy;

3. The Millennium. As the Apostasy is nearly destroyed, we must be near the millennium.

II. Signs Of The Times.—1. The steamship, railroad, telegraph and telephone are binding the world together.

2. Inventions of all kinds, conducive to man's happiness, and elevation are being brought to perfection.

3. Public schools, colleges and universities, the pulpit, press and rostrum are educating the people.

4. *False* science is being crushed by the fierce blows of Wilford Hall and his co-laborers, and *true* science will be raised on its ruins.

5. Woman is being released from her shackles, and placed where she can wield the great moral power which God has given her.

6. The temperance movement is banishing the greatest curse of the age, and preparing the world for the spread of Christianity.

7. Christianity, the great power, without which all others would fail, is spreading all over the world. Under its influence even Asia, Africa, and the isles of the sea are awaking to new life.

What Is Necessary To Usher In The Golden Age? 1. A general society should be organized with this object in view, to look after all branches of the work in all parts of the world.

2. The temperance movement, which is preparatory, must carry the constitutional amendment of Kansas and Iowa into every State of the Union.

3. The temperance movement *must* be followed by a *religious movement.* Iowa and Kansas are now ready for this religious movement.

How Can It Be Effected? A society composed of men and women of all religious bodies should be organized in each State, for this purpose.

2. Each society should send one or more evangelists over the State, to arouse public sentiment.

3. Each church should work and pray for a revival of religion.

4. Revival meetings should be held in every church in city and town, and in every schoolhouse through the country.

Every work must have a beginning, and that beginning is generally humble. All who favor this work, please drop me a card or letter.

Redfield, Iowa.

MENTAL FORCE THE SOURCE OF ALL ACTIVITY.

[Concluded from Last Month.]

BY ISAAC HOFFER.

That a moistened lump of earth should be transformed into a growing plant with beautiful flowers is looked upon as one of the greatest mysteries and inimitable achievements of Nature; and yet man takes another lump of earth, transforms it into a fine steel spring, and makes it move the machinery of a watch that marks the flight of time, which is a transformation apparently more extended, more varied and more complicated than that of the lump of earth into a beautiful flower. No one disputes the fact that mind is the efficient cause in the transformation of earth into a steel spring, and why should not mental force be the efficient cause in the transformation of earth into a plant and flower? If there would be any other force that is a self-acting energy, an originating, active power manifested in Nature, then the question might arise which is the efficient cause?

It seems unreasonable that we should search for the cause of the activities in Nature, in that which has no action in itself, or in a thing that is moved or even in the motion itself, which is only an effect of an impulse, when we know of an impelling power that can originate, apply and direct motion. We know that every work of man had its inception, and its development in all its details to the final completion, perfected in mind before it was brought into manifest being. It is true that part of it only may have been designed at one time, but every part was first formed in mind before material representation could be made; for *all work is only a material representation of mental operation.* Conception of the purpose or accomplished result is the initial thought. The development of this conception brings about a comprehension of the whole subject, and the mental operation of this matured comprehension materially represented is the accomplished work of man.

In all the operations and works of man there are but three things employed, mind, force and matter. Of these, mind is the elementary and operating power, force the active agency, and matter the passive thing acted on. Man is a part of Nature and she manifests a certain mode of operation in and through him which produces definite results; and it is not reasonable that a different mode should prevail in all her other operations. Nature cannot be inconsistent with herself. If force and matter are mere agencies in one kind of operation that is consistent with the order of Nature, they are mere agencies in all her other operations. Mental force belongs to Nature just as certainly as man does, and is as properly a part of Nature as is attraction, affinity, vitality, magnetism or any other invisible power manifested in her activities. Mind is an important and essential part in Nature, not a mere product of force and matter, but primarily a directing and controlling part; the only part that has self-exerting energies with power of causation capable to originate, impell, direct and control. Force and matter could never have established the present state of things in Nature. Uncaused, undirected and uncontrolled action cannot be conceived, and they can produce no results. The laws of Nature, the system and order in all her works, give unmistakable evidence of a directing and controlling power, such as is only found in mental force, and such as was an absolute necessity to accomplish the results exhibited in her works. Without mind Nature with all her works could have no known existence, and man would be no more than a lump of clay.

In man, mental and physical force and matter—the psychical and physical—are brought into a perfect interaction. The material element is adjusted to the conscious and is personalized, and the conscious element is brought into a self-manifesting condition. The invisible psychical becomes a known manifesting power through the personalized material. In man, therefore, mind, force and matter are united in one interacting personality. In this union the mental part supplies that which gives apprehended and known existence to the activities and works of Nature. It gives conscious power and active energy to man, and is that which in its action is a typical representation, in kind if not in degree, of the efficient cause of all the activities and their results in Nature.

THE CONSERVATION OF ENERGY.

BY BARTEN S. TAYLOR, M. D.

Those who advocate the doctrine of the conservation or persistence of energy make the word energy to include dynamic energy, potential energy, and the energy of the inorganic forces. Dynamic energy is the power of moving bodies of sensible size to move other bodies. Potential energy is the dynamic energy which may at some future time be. This class of scientists suppose that the inorganic forces—gravity, heat, electricity, etc.—are moving molecules of matter, and hence class their energy with the energy of moving masses of matter. There is no propriety in including potential energy. Energy that may possibly be at some future time has now no existence, and to treat it as something now existing is a false view. Potential energy is now a non-existence. To make it appear that the quantity of energy is an unchangeable quantity, scientists add to existing energy a quantity of non-existence.

Then it is a well settled scientific fact that one of the inorganic forces is never transformed into another. Fifteen and twenty years ago scientists talked much about the conversion of gravity into heat, and heat into electricity, and electricity into magnetism, and so on; but we know now that no such conversion ever takes place. Gravity pulls a body down, and by its collision with the earth, a portion of heat is made to become sensible; but gravity pulls upon the body just as hard after the heat is made to appear as before. Heat is said to produce electricity, but there is no decrease in the heat. Electricity is said to produce magnetism, but there is no decrease in the electricity. Magnetism is said to produce electricity, but there is no decrease in the magnetism. Chemical attraction is said to produce heat, but there is no decrease in the chemical attraction. It is now well known that no instance of the transformation of one inorganic force into another has ever been discovered by man. What a world of literature has been wasted over these imagined transformations that never take place! This fact destroys all the arguments drawn from this source in support of the doctrine of conservation of energy.

The only remaining question then is this: Is dynamic energy indestructible, or a constant quantity? A few experimental facts settle this question. Throw a cannon ball weighing, say fifty pounds, up from the bottom of a mining shaft one thousand feet deep, with a charge of powder just sufficient to throw the ball a foot or two above the surface of the ground. The shaft is a little inclined so that when the ball ceases to ascend it describes a small arc and rests upon the ground. All the dynamic energy which it did possess is now gone, and a body resting npon the surface of the earth has no potential energy with reference to gravity. Discharge the same ball with the same quantity of powder horizontally. At the distance of one thousand feet it strikes a target with as much force as a fifty pound ball falling through one thousand feet would strike the earth. From the ball when discharged vertically is taken away by gravity as much dynamic energy as would be exerted by a fifty pound ball falling through one thousand feet. So much dynamic energy is gone, lost, destroyed.

In every case where the dynamic energy of a moving body is taken away by an attractive force it is not transmuted into any other form of energy, but goes out of existence, is destroyed. We have room to mention only one other case of this kind. Suspend an iron bar horizontally, with a twisted string, between two electro-magnets. While the magnets are connected with their batteries the bar remains motionless. Detach the magnets from the batteries and the bar begins to revolve from the untwisting of the string, and rapidly increases its rotary velocity. The revolving bar now possesses a degree of dynamic energy measured by its weight multiplied by the square of its velocity. Re-connect the batteries and magnets and the bar almost immediately stops revolving, and all the dynamic energy it did possess is destroyed, lost from existence.

Dynamic energy may be destroyed by other than an attractive force. A ball weighing five pounds, for example, flying through space at the rate of one thousand feet a second, is hit by another ball of the same weight, moving at the same velocity at right angles with the direction of motion of the hit ball, both of them inelastic bodies. The velocity of the hit ball is not altered, but it is turned out of its course 22½ degrees. The hitting ball loses half of its velocity and three-fourths of its dynamic energy. Before collision the dynamic energy of each ball is as 5x1,000x1,000=50,000. After collision the dynamic energy of the hit ball remained the same, 50,000, while the hitting ball, lost half its velocity, and its dynamic energy was 5x5000x500=12,500. Here is the destruction of a quantity of dynamic energy designated by the figures 37,-500.

If both balls were perfectly elastic, and should thus collide, the hit ball would be turned out of its course 45 degrees, without any increase in its velocity or dynamic energy, while the hitting ball would come to a dead stop, and lose all its dynamic energy. This is a loss and destruction of a quantity of dynamic energy designated by the figures 50,000, all that a body weighing five pounds, moving at a velocity of 1,000 feet a second possesses. No scientific fact is more plainly demonstrated than that dynamic energy is destructible, and that therefore what is called the conservation or unchangeable quantity of energy is a baseless fiction. When we consider that energy is only a property, and remember that properties may become more or less, may appear and disappear, may be and then cease to be; and when we know that our own conscious property of energy may be exerted more or less, may be active or latent, we see the utter folly of endeavoring to show that the quantity of operative energy on the earth is a constant quantity.

SOMETHING OUT OF NOTHING.

BY ELD. J. J. MILES.

If I could conceive that God could create *something out of nothing*, I could conceive that God himself originated from nothing, and that there was a period when there was no God, and no universe. The Bible nowhere asserts that God created the Heavens and the earth out of nothing. To suppose that God is eternal, and matter or that out of which God made matter is also eternal, but not of the essence of God, is to suppose the eternal existence of something independent of God, and yet exactly adapted to all the purposes of an all-wise Infinite Mind or Spirit. How came this substance, out of which the universe is made, to be perfectly adapted to all the purposes of the

Infinite Architect? This perfect adaptation to an Infinite variety of allwise purposes, is proof of design—infinite design. And design is an attribute of mind. If a God without beginning presents a difficulty, an incomprehensible difficulty, it more than doubles the difficulty to suppose both a God without a beginning and also the original elements, out of which God made the universe, without a beginning, yet perfectly adapted to all the infinite purposes of the Infinite God.

Human reason and science can find no easier solution of the problem of the origin of the universe, than the truth that God is a veritable being, an essence, without beginning, self-existant, and that He created all things "from Himself." And we understand the Bible to teach just this.

INTERFERENCE IN SOUND.

BY CAPT. R. KELSO CARTER.

"*When two sonorous vibrations meet and make silence, they are said to interfere.*"—*Mayer on Sound, p,* 124.

"You must have remarked the almost total absence of sound on the part of a vibrating tuning-fork when held free in the hand. The feebleness of the fork as a sounding body arises in great part from interference. The prongs always vibrate in opposite directions, one producing a condensation where the other produces a rarefaction, a destruction of sound being the consequence. By simply passing a paste-board tube over one of the prongs of the fork, its vibrations are in part intercepted, and an augmentation of the sound is the result. The single prong is thus proved to be more effectual that the two prongs. There are positions in which the destruction of the sound of one prong, by that of the other is total. . . . When the corner of a prong is carefully presented to the ear the sound is utterly destroyed" &c. —Tyndall on Sound, p. 272.

From these quotations we can clearly see that the vibrations of one sound are supposed to collide with those of another, and thus arrest all vibrations and produce silence. Now let us consider these statements. In the first place we are tempted to squarely deny the truth of the experiment given above. Prof. Tyndall says that if a tube be placed over one prong of a fork, the sound will be augmented, and that this proves that the sound was weak because the two prongs "interfered" with each other. We simply ask the question, would it not be a much fairer experiment to operate on two instruments, one having two prongs, and the other only one, but of the same pitch?

Perhaps this never occurred to the Prof. We have not tried it, but we have tried the covering process with variations, and positively affirm that there is not an iota of truth in the deduction made by Prof. Tyndall. True, if one prong of a sounding fork be carefully inserted in a tube of *suitable* size, the sound will be somewhat increased, but the true reason is found in the plain fact that the air in the tube is thereby thrown into vibration and thus re-inforces the sound. Probably Prof. Tyndall, with that beautiful adaptation to happy accidents that characterizes so much of his experimental work, used a tube which *happened* to be of such a length as to nearly correspond to the fork, and therefore resounded loudly when the prong was inserted. But that there may be no possible question about the matter, let anyone take a sounding fork and carefully pass between the prongs a flat card, when there will be no possible alteration in the sound one way or the other. This we have done; and of course it is obvious that, for the end in view, the flat card is just as effectual as a tube; for the "interference" is as certainly arrested in one case as in the other. We of course do not refer to the particular position of the fork when held corner-wise to the ear, for in that case *when held close*, there is a great loss of sound, but never, as Tyndall claims, a "total extinction." It is a disagreeable thing to say, but it must be said that the "total extinction" is simply and plainly untrue. Try as you may, twist the fork with the utmost care, there is always plainly audible a distinct sound. Let those who doubt try for themselves.

On Page 99 Prof. Mayer places three candles on the corners of a triangle and claps his hands between them in order to show the effect of the vibrations of a fork in the surrounding air. The candle flames move in and out, but he falls into the same blunder which entrapped Prof. Tyndall in discussing the explosion at Erith, viz: confounding the air puffs with sound pulses. We would respectfully suggest that Prof. Mayer place a good sized table gong bell between his candles, and after sounding it, report the effect on the flames. The gong makes more sound than the fork and clapping, but the flames do not stir. Why is this? Perhaps Prof. Tyndall might shout the explanation through his fifteen foot tin horn, if it were not for the fact that *The Microcosm* having pointed out and filled the gaps and hollows in his sound theory he has stuck to the theory, and the two blasts have produced silence. Were he to speak, the very fact itself would upset the wave-theory of "interference." Another rare feature of the unfortunate wave-theory is found in the "interference" of the facts when a fork is held before a resounding tube. Let the fork prong move toward the tube. According to the wave-theory this produces a condensation, and this condensed pulse travels down to the bottom of the tube and back again, just in time to join the prong as it begins to swing away from the tube. Now if this be so (and what wave-theorist will dream of denying it?), it is obvious that while the condensed pulse is travelling down the tube it goes the same way as the prong which gave it impetus; but as soon as it rebounds from the bottom of the tube (or rebounds from nothing if the tube be an open one), and begins to travel back up the tube, it is plainly and directly opposed by the prong which is still moving towards the tube. Grasp the situation and deny it who can. Here is a motion perfectly independent of the motor, moving with like rapidity when assisted or opposed by the very motor which started and controls the motion. Imagine the fly-wheel of an engine quietly and silently reversing its motion during one-half the circuit of the crank, moving either way with equal ease, and you have the precise problem in dynamics whose very existence was never suspected by the "greatest living authority" in sound. Is there any end to these absurdities? Yet follow on a little further. The fork prong has reached the point nearest to the tube, and begins its outward swing; the condensed pulse has traveled down the tube, traveled back again in the very teeth of the interference of the fork, and is ready to re-enforce it in its outward swing. But just how is this re-enforcement effected? Which side of the

prong are we to look at? This thing begins to look like the fabled shield of many sides. The outward side of the fork is about to move out and produce a condensed pulse; and is our condensed pulse, which has just arrived from the bottom of the tube, to reinforce that, thus making a doubly condensed one? This would seem to be the wave-theory, but there is an "interference" here. If so, what about the air in the tube? what is its condition while the two condensed pulses are moving outward? Oh! here we must look at the other or inner side of the receding prong. Of course the air in the tube must be rarifying, or else it would be continually condensed; but how can a rarefaction by any possible means reinforce a condensation? Wave-theorists declare that a condensation and a rarefaction together "interfere" and produce silence; yet here we have a rarefaction following close on the heels of a condensation, separated from it only by the mere thickness of the fork itself, and yet actually augmenting the sound. Here is "interference" with a vengeance. In the next number we will present a mathematical, or rather optical, demonstration of the utter absurdity of the wave-theory, as viewed from the stand point of interference.

PA. MIL. ACAD., August, 1882.

P. S.—How did Tyndall *happen* to use a pasteboard tube instead of a flat card?

ELECTRICITY THE MOTOR POWER OF THE SOLAR SYSTEM. No. 3.

BY B. T. KAVANAUGH, M. D., D. D.

The Annual Revolution of the Earth the Result of Electric Action.

We have shown in the preceding number that the elliptic form of the earth's orbit and the inclination of its plane are constructed in strict conformity to electric laws.

It remains now to be shown that the earth is propelled and carried forward in the pathway of its orbit by the attractive and repulsive action of electric currents.

Before proceeding to show by what process this result is produced, a few general remarks will be necessary to bring the subject properly before the reader. We lay it down as an axiom in the laws of Nature, that whatever God creates, He governs; and the elements or principles by which His government is secured are incorporated in the organism, constitution and structure of the thing created. This rule will apply alike to animate and inanimate forms of existence.

In the structure of the earth, therefore, the Great Architect of the universe must have foreseen the necessity of incorporating in its organism the elements of power essential to control its action, whatever that action might be. If the object of its creation was to take its position as a planet forming a part of the solar system, and to be placed under the control of the great central orb, the sun, then the elements of power implanted in it must correspond to, and be the counterpart of, the governing element of that central orb. When we thus analyze the Divine plans, we enter into God's great thoughts.

In a future number, when we come to consider the structure and functions of the sun, we shall show that it is the great central source of light, heat and electricity, and it is by the active energies of these vital agents that all its planetary worlds are governed. Assuming this to be true for the present, then the earth must be endowed with elements of power corresponding in their nature to the demands of the sun upon it, which demands seem to have been fully met by constituting it a great polarized magnet of an opposite character to the electricity of the sun.

Now let us suppose, for argument's sake, that the earth was endowed with the power or force of *gravitation* only, the question arises as to whether this gravitation is capable of performing the various offices we find necessary to establish a polarity in the earth, the interchange of ocean currents, the rotation of the earth upon its axis, the elliptic form of its orbit, and the driving force with which it is propelled forward in its orbit; and if incapable of producing any of these necessary results, and it corresponds to no quality whatever of the sun, then we may ask what office it does perform, and what the limit of its action?

We answer that the earth does possess a force which we call gravitation, whose office it is to hold the earth with its mass in a solid body, balancing upon its own centre, and holding all the elementary constituents of its existence a unit, and to give stability and firmness to all the tenements and superstructures occupying a place upon its surface. It has a controlling influence over the atmosphere, and may extend its dominion to its own satellite, and here its powers cease.

The idea that the sun is a solid body, and that it exerts a gravitating force proportionate to its quantity of matter, over the earth and all the other planets, is an assumption wholly unsustained in the light of true astronomic science, by any known facts, as will be seen when we come to treat of the sun.

By repudiating the doctrine of UNIVERSAL GRAVITATION, we are relieved from darkness and difficulty on many subjects that have their origin in this fallacious theory.

1. It is contended that our earth and all other planets are endangered in a liability to fly from their assigned orbits, and to come in collision one with another, producing "a wreck of matter and a crash of worlds;" whereas, by our theory, all the planets in the system being heavily charged with negative electricity, repel each other, making such a collision a natural and scientific impossibility.

The repelling force existing in each planet against all others, is demonstrated by the experiment of the pithballs upon an electric machine. If we attach a dozen pithballs to the conductor by light threads six inches long, and throw a current of electricity on them, they all rise and stand apart, each repelling the other at equal distance in all directions. The same law acts upon the planets in like manner.

2. The gravitation doctrine holds that the earth, in revolving in its orbit, is kept upon a balance between the centripetal and centrifugal forces, which are said to control it in its action, and should the centripetal bring the earth too near the sun, it would immediately plunge into the bosom of that luminary and be consumed; and should it depart too far, the centrifugal force would gain the mastery and carry it riotously into the outer regions of space where it would be lost.

Both of these suppositions are as false as the premises on which they are based. To demonstrate this we have only to allude to the eccentric course of the comet, which, moving in a very

elongated ellipse, comes dashing in from the remotest regions of space, and directs its course so near the sun that it passes between it and the nearest planet, almost touching the corona of the sun, and yet it does not fall into it. On the contrary, being a nebulous and not a solid body, it becomes charged with positive electricity from centre to circumference, and is therefrom repelled and driven again to its distant aphelion, where, losing its positive character and becoming negative, it is recalled to the sun for a fresh supply. In this action of the comet it certainly crossed both danger-points, and was neither consumed on the one hand, nor lost in distant space on the other. From the foregoing and other considerations, we do at once and forever exclude the doctrine of universal gravitation from any agency whatever in connection with the solar system.

The question now recurs: By what force is the earth carried forward in its orbital journey around the sun? After much serious and patient consideration, we are driven to the conclusion that the same forces which cause its diurnal motion are employed in giving it its annual motion also.

In one thing we agree with the great Christian philosopher, Sir Isaac Newton, that is, that the All-wise Creator, after the earth was complete and perfect in all its parts, launched it forth whirling upon its axis, and moving forward in its orbit by a momentum given it at the beginning; but we do not think with him that this momentum would maintain it in unabated motion forever. All that was necessary to perpetuate its revolutions was added by placing it under the control of the electric currents of attraction and repulsion emanating from the sun. This being done, His work was complete, and God rested from His labors with regard to its future action.

We have shown in our first article, that by attracting that side of the earth which had passed through the shades of night and thereby become negatively electric, it was drawn towards the sun from west to east, so that so much of the surface as reached the meridian became charged with positive electricity, and the receding side was repelled, giving to the earth its diurnal motion.

I now take the position that the receding side of the earth, being heavily charged with electricity, is not only driven with a sufficient force from the sun to cause its rotation on its axis, but there is a great excess of force repelling it forward in its orbit. I adopt this idea for the reason that on the negative or rising side of the earth there is no resisting force, but a strong attraction drawing it in the same direction.

This position gains strength from the consideration of the fact that light, heat and electricity are imponderable, and therefore incapable of momentum. That when the rays of the sun, combining all these elements, strike the earth, not centrally, but on its eastern border, the light is converted into heat, and ultimately into electricity proper, which expends its force in all directions; hence a lateral force is as natural to it as a perpendicular. In a circular area of 8,000 miles in diameter, covering the eastern side of the earth, beginning at midday, and exhausting itself at midnight, a vast body of positive electricity is accumulated, and must strike the earth —the only opposing surface near it—with immense force, driving it in the direction of its course on its orbit; while, on the other side, there is a comparative electric vacuum into which it is continually plunging, and is driven on its orbital path, as is commonly estimated, at the rate of 68,000 miles an hour.

In the further consideration of this subject it must be borne in mind that the earth is confined in its distance and relations to the sun by a strong attractive force on but *one* side, and hence the only direction that it can find retreat from the immense force pressing upon it is in the direction of the line of its orbit, which sends the earth around the sun, as seen from a northern standpoint, in the opposite direction to the hands of a clock, but as seen from a standpoint south of the equator, its motions are in accordance with those of the hands of a clock.

These are legitimate results, growing out of the application of the forces as they are known to act in producing the annual motion of the earth in its orbit.

OWINGSVILLE, KY.

[The following is the great Review of the "Problem" which we promised last month, and which we copy verbatim from the *Reformed Quarterly Review* of Philadelphia for July last].

WILFORD HALL'S NEW PHILOSOPHY.

BY REV. JOHN I. SWANDER, A.M., TIFFIN, OHIO.

A new book has made its appearance. It is not so much a fawning candidate for public favor as it is a fearless criticism upon popular fallacy. It *is* a new book—not in the sense of recent origin, for it is now in its thirty-first edition, and has been in limited circulation, for several years, in one or more of its revised forms—in the sense of its singular interest and amusing novelty. It is not new in the subject which it brings under discussion, for others, before him, have struggled toward the solution of the great problem of human life, here and hereafter. Neither does it sound the alarm of a new enemy upon the field of conflict, but rather recommends a change of munition and tactics in meeting the old armies of the aliens, who continue to say, in their foolish hearts, and argue, in their fallacious theories, that there is no God. It makes no new concessions to the leading champions of atheism. On the contrary, it rises to a point of order and questions both the wisdom and courage of Christian theists, who are charged with surrendering the vantage-ground of eternal truth in their recent acknowledgment of certain claims made by the leading advocates of Evolution. The peculiar freshness of the book consists in its new line of scientific defense of the dogma of God's personal existence, and in the equally scientific justification of the hope of the soul's immortality. This new line embraces both the peculiar stand-point from which it hurls its pointed javelins to the apparent discomfiture of false science, and the method of its most vigorous assaults upon the strongholds of modern materialism.

Who is A. Wilford Hall? The question will certainly not be regarded as an offensive interrogatory. While he gives undoubted evidence of his distinct and positive individuality, he is nevertheless so modest in his first appearance upon the scientific stage, that it is exceedingly difficult, in the absence of the family record, for any one to trace his lineage. Judging, however, from the evidence of his thorough acquaintance with the entire field of modern science, and from the manner in which his powerful pen is made to wield its

sturdy blows at the somewhat plausible theories of those whom he looks upon as the unscientific champions of the age, he is no longer a youth, although he may be, and continue to remain "to fortune and to fame unknown." And it is herewith predicted with self-evident certainty that his fundamental position in philosophy will soon pass away like some comet, whose orbit is an infinitely elongated ellipse, or rise to that magnitude and lustre, which shall cause the other stars of the scientific firmament to pale their relative brightness before its superlative glory. One thing is beyond controversy: the new theory projected in this new book can never crumble away by fragments. It is destined to fall, if fall it must, like the Philistine temple, by the removal of the pillars that support the superstructure; and only when the pillars shall give way, and tumble the temple into ruins, will the world be furnished with another great demonstration of the possibility that a blind man may bury himself under the rubbish of his own Herculean work.

But Wilford is *not* entirely blind. Although he seems to betray a remarkable fondness for sporting with the Delilahs of atheistic scientism, his unusual faculty of discernment will probably protect him from the seductive arts of the Philistine lords. His caressings are rather those of the frisky young feline in its caperings with the impotent little mouse,—an amusement preparatory to the work of utter annihilation. At this present writing it appears that this young Samson of New York City is not as apprehensive of any immediate violence to his organs of scientific vision, from the uncircumcised Philistines of Evolution, as he is from those whom he seems to regard as the invertebral class of Christian theists. And if his past fidelity to what he holds to be the keystone principle to the whole arch of scientific investigation, and his present vigilance in seeking to make nothing but logical deductions therefrom, are to be taken as an indication of his future course, it is quite probable that he will not allow himself to be betrayed by false friends, nor suffer his eyes to be gouged out by open enemies. Neither will it do to proclaim him a blind fanatic, full of vagaries and vanity, because he has dared to cross the path of much that enters into the world's most popular thinking. Let it first be demonstrated by a full college of medical oculists (after they have taken the motes out of their own eyes), that his visual organs are actually in a diseased condition. In the meantime, it would be well for those who contemplate the task of showing that this new philosopher is really in danger of afflicting himself and others with the forbidden fruit of his defective vision, to begin their examination without unnecessary delay, for fear that this rising judge in our scientific Israel may hasten to unite the recent theories of conservative theists with those of the open and avowed atheists, in the same laughable manner that his prototype did the foxes, in a former display of comical pyrotechnics.

The author of this new book takes rank among the inventors of the age. In fact, the dawn of the twentieth century will find him without a peer in this department of intellectual inquiry, if his announced propositions should be sustained by the demonstrative evidence and reasoning brought to bear in the volume of the book. And it is fervently hoped, that, for the sake of variety, if for no better reason, his invention shall prove to be as useful in the sphere of science, as it is ingenious and ornamental in the world's great cabinet of curiosities. Mr. Edison may appear with the longer list of discoveries in Nature's partially explored domain, but this man claims the credit of bringing before the public an original contrivance, which, if it shall prove to be what its maker confidently expects, must leave the modern master of electricity to look after his laurels. Edison proposes to carry forward his work to such a degree of perfection that shall make it not only possible, but also practicable, to illumnine our metropolis, if not our entire Continent, by the mysterious means of manufactured lightning; but our author seems perfectly calm in his intimation that he has discovered a "substance" which renders it not only possible and practicable, but also probably and absolutely certain, that at no distant day the gross darkness of false science shall disappear before the effulgence of that new light, whose intense luminous rays shall kindle a conflagration of the world's combustible fallacies, and usher in the brighter splendor of a more auspicious morn.

Mr. Hall has invented an hypothesis,—one that leaps into existence from the laboratory of no ordinary brain, and gives evidence that it is the joint product of profound thought, extensive research, comprehensive scholarship, and Christian honesty. It is his own legitimate offspring, and, no matter what others may think or say, he prides himself in the bantling of his prolific genius. This new invention is his fortune. While there is no evidence that he has filed his petition for letters-patent, he gives notice of his rightful priority to the honors of this wonderful discovery, and frequently intimates, throughout the book, that he has no intention of shining in a borrowed lustre, when this new sun of scientific splendor shall rise to the zenith of its glory.

Well, this man has a right to invent an hypothesis, or anything else, indeed, that can be made to subserve the purposes and progress of true science, and rout the rats of unscientific sophistry from their verminous nests. The Bible, itself, starts and proceeds upon the assumption that its Author's existence is a fact never called into question, except by those who are fools at heart. So with each distinct mystery of our holy religion. They are not proven in advance, but projected upon the world for the very purpose of preparing the way for the demonstrative testimony of the truth in which they shall be ultimately vindicated and glorified. The human family, in its intuitive longings for the truth, has a reasonable right to expect that the Author of Revelation will raise the subject-matter of which His Book treats, out of the sphere of the hypothetical, and carry it forward, gradually or otherwise, into the cloudless region of absolute certainty. So has this scientific age a right to insist that the author of "*The Problem of Human Life*," shall raise his new hypothesis to the rank of a rational theory before it is entitled to unqualified regard. The public has no right, however, to insist that he shall answer all questions that may be propounded by his opponents, or projected by his own hypothesis, before he has had reasonable means and time for its demonstration and development. This much he claims and insists upon in common fairness. Alluding to certain admitted forces in nature and facts in science, the author says: "If, after carefully comparing all such facts with my provisional hypothesis, I shall conclude that more phenomena are explained by it, and the various classes of facts made more harmonious and consistent among themselves than by means of any other known hypothesis, it is logical and fair to claim the result

of such investigation as a probable scientific theory." Page 416.

The corner-stone of the author's hypothetical superstructure is the assumed existence, around, within, and above us, of an invisible, inaudible, and intangible universe of veritable entities. In this bold assumption he seems, at times, to occupy the true Christian stand-point in his earnest search for the assurance of things hoped for, the proving of things not seen. Heb. 11: 1. But when he attempts to carry his philosophy into the sphere of Christian dogmatics, he proves himself a failure. If such expressions as may be found on page 56 are fairly exponential of his philosophical principles when applied to the great mystery of the Incarnation, and if logical consistency actually requires him to make the application in such forms of speech, we must part company until such future time when he shall see fit to revise that portion of his very valuable book, or the writer of this article be made more able to sing the Lord's song in a strange land. But hear him: "His word became flesh. . . . . If this *word* could become *flesh*, it could become *wood*, or *rock*, or *iron* as well. . . . . His word was changed into corporeal flesh. . . . . He condensed the 'flesh' of Christ from the word of His power." It should be remembered, however, that the above extracts are taken from the author's part of the Wilford-Sheldrake correspondence, in which Wilford, while he has decidedly the best of the controversy, seems, nevertheless, to have been led out of his proper sphere into a country in which he would do well to consult the directions of the guide-post before he proceeds very far in any direction. It is quite probable that the next edition of the book will show either an elimination or improvement of his theology. His field is evidently that of physico-biological science. Here he is at home. Here, too, he is to be admired for consistently holding, in common with many other Christian thinkers, that the mission of true science is to move, not toward the outward and material, but the inward and substanial, until it actually sees the invisible, hears the inaudible, and grasps that intangible something in the vast domain of absolute existence.

Our author launches his philosophical bark upon an ocean of observation and induction sufficiently broad to include God, Man, and Nature. He insists that God is not only a personal Creator, but also a substantial Jehovah,—that He created all things, not of nothing, but out of His own eternal substance, the Fountain from whom all the substances of the universe have proceeded. Man, as also all animals, consists of an incorporeal substance, or invisible organism, of which the corporeal structure, or body, is the counterpart. Man was not evolved by some impersonal, protoplasmic force, from the moneron, through the monkey, *via* the missing link, but created, or made, by a miraculous act, not "out of things which do appear" (Heb. 11: 3),—not of nothing, but of His own all-pervading substance, "even his everlasting power and *divinity*." Rom. 1: 20. There is no entity in nature whose existence is in mere molecular motion. However highly attenuated, all force is substance. Passing beyond the generally admitted facts of science, as to the material and substantial existence of *air*, *light*, *odor*, and *electricity*, our philosopher declares that *gravity*, *magnetism*, *heat*, and *sound* are as literally and truly substances as the veritable atmosphere with which we expand our heaving lungs. Then, bravely swinging his scientific flambeau, he advances into the more metaphysical department of philosophical inquiry, ascends the rising scale of a regular gradation, and predicates substantial, entitative being of *life*, *soul*, *mind*, *spirit*, and God—the Fountain of all. In fact, Wilford's new system, if, indeed, it shall prove to be a system, may be called, emphatically, a Philosophy of Substance.

But is it a system? If a system, is it new? Does its appearance mark a new epoch in the world's great history of philosophical inquiry, discovery, and progress? Our author does not claim to have evolved any new principle, and he gives abundant evidence that he is too consistent as a Christian, and too sound as a theist, to arrogate unto himself any creative power. That he has been a devout and apt student of philosophy, especially in the domain of Physics and Biological research, is evident from his manifest intimacy with everything pertaining directly to those important branches of the general subject. He does not claim, like Mohammed, to have journeyed on a white mule to heaven for a revelation of truth, but, in his seclusion, for more than a quarter of a century, from what he regards as the superficial scholasticism of the world, he has been holding communion with the heart of Nature, and noting the phenomena of its interesting pulsations. During that time, he also had opportunity and means of acquainting himself with the leading orthodox members of the scientific church, as well as her most dangerous heretics, both of the past and present; and now, in this unprecedented age of startling events and stunning announcements, he comes forth to dispense the blessing of his discoveries to all honest and earnest investigators after truth, and drive the Alboraks of atheistic evolution to the utmost boundaries of everlasting contempt. While he shows intimate acquaintance with, and due deference for many of the schools, students, and theories of the past, and acknowledges himself indebted to the ages gone by, as every honest scholar is bound to do, his book is certainly more than the rehash of a kind of meat served at former feasts. His philosophy has a distinct individuality, with features as marked, and as peculiarly its own, as ever were predicable of the theories of Descartes, Newton, or Spinoza; and it remains to be seen whether the future historian's impartial pen shall not record *his* discoveries as more important to the interests of true science, and more abundant in their blessings to the family of man. The superficial student of the history of philosophy, after reading Wilford's book in hasty prejudice, may see nothing but a few fragments of Descartes, or some of his partial admirers or imitators, like Fichte, Hegel, Leibnitz, Kant, or Swedenborg, whose streams of speculation seem to have started at the foundation of Cartesianism; but the scholarly and honest reader cannot fail to see that this new hypothesis of Wilford Hall is not only distinct in its essential elements and features, as well as original in many of its discoveries and arguments, but, also, as far from the metaphysical meanderings of Descartes as it is from the Pantheistic "substance" of Spinoza; as different from the Idealism of Kant and Fichte as it is from the Materialism of Haeckel and Huxley; as remote from the skepticism of Hume and Berkley as it is from the sensationalism of Hobbes and Locke. If Wilford is a copyist, Leibnitz is his model. Between the two there is, at many points, a marked resemblance, but not in such a sense, or to such an extent, as to destroy in either an equally marked individuality. Wil-

ford is unequal to Leibnitz in the wide range of versatile scholarship, but not inferior in mental activity. Leibnitz, besides philosopher, was jurist, theologian, mathematician, historian, and metaphysician; Wilford is physicist, biologist, and a very sprightly journalist, with metaphysics and mathematics enough to demonstrate the most supreme absurdities of the age. Wilford is exploring regions to which Leibnitz, with all his vast attainments, was a stranger; and gathering flowers from fields hitherto unranged by the pioneers of thought. Wilford's "substance" may be compared with the Leibnitzian "monad" in theory, but Wilford is superior to the philosopher of Leipsic in his attempts to utilize his "substance" for the solution of the practical problems of the age. Whatever defect may hereafter be made to appear in the work of Wilford Hall, one thing at this writing appears reasonably clear,—he is not a plagiarist. His views are his own. They are as honestly possessed as they are ably defended,—as consistently held as they are logically unfolded.

This new book seeks to solve the interesting and momentous problem of human life. The first part, confronted by the admitted throes and threats of physical dissolution, has directly for its object the evidencing, upon scientific grounds, the innate idea and darling hope of conscious immortality. Indeed, this is the objective and ultimate point aimed at, though at times indirectly, throughout the entire work, which may be regarded as three books in one volume. Yet the book is *one*. Each part finds its correlative and complement in each other. The assumption of the substantial, entitative existence of that which "eye hath not seen, nor ear heard," underlies the whole organic structure of the work, and animates every essential syllogism in its masterly argument. He makes the human soul consist in a real organism, as literal as that of the "outer man," which perisheth. From this general hypothetic proposition he proceeds to apply the principles of his philosophy to the more satisfactory solution of the great question of unending human existence, and, consequently, to the more full realization of that golden dream which, even now, brightens the visions of earth's short night, and sweetens the anticipations of Heaven's eternal day.

This theory of the substantial elements and organic structure of the soul implies, according to our philosopher, the substantial nature of God Himself. He says: "The substance of Deity constitutes an infinite and inexhaustible fountain of life and mentality, from which our individual life and mentality come originally as drops." (Emanatio-traducianism?) Creation is an effluence *of* God, rather than an influence proceeding *from* Him for the accomplishment of creative acts. He fortifies his position behind the generally admitted scientific axiom, "*From nothing, nothing comes.*" This necessary link in the chain of his argument has already caused such a tinkling as to stir up a polemical hornets-nest in that corner of the Westminster Confession which teaches that God made all things out of nothing. Dr. W. W. Barr, Philadelphia, Editor of "The Evangelical Repository," stepped to the front in defense of the faith once delivered to the Westminster saints; and declared that it is "believed by Presbyterians, without exception," that God made all things out of nothing—that *ex nihilo nihil fit* may be true as an axiom of science, but untrue as a theological dogma.* The correspondence upon this point in theological science, between our author and Dr. Barr, will lead the honest reader toward the conclusion that everything, except the first section in the fourth chapter of the Westminster Confession, has been made out of something substantial.

In this Wilford-Barr correspondence concerning the nothingness of God's manufacturing material the publishers of *The Problem of Human Life*, at the suggestion and under the promptings of the author, took a tilt, in a manner that complicates the amusing controversy. The publishers quote, approvingly, from a "masterly paper," prepared by "A Presbyter of the Diocese of Ohio," on the "Kingdom of God," and published in the July number (1879) of this Review. Hall & Co. seem, however, to have been under a false impression when they mentioned this Review as a "Presbyterian Quarterly." They seem, also, not to have known that the writer of said "masterly paper," although a "Presbyter," was no Presbyterian, but a minister with a long line of Reformed ancestry, and consequently with little theological resemblance to men who profess to have been made "out of nothing." A Primer in Modern Church History might be of service in the school of this new philosophy, since the discussions arising therefrom will unavoidably, at times, carry the war into the adjacent ecclesiastical territory.

Our philosopher, in his new departure from much which has been idolized by the devotees of science, in the blind veneration of the past, turning his face to the morning of a better day, claims to have discovered the very Gibraltar of truth, upon which its embannered hosts may stand, and from whose impregnable fortress they may hope to carry the campaign into the empire of Evolution, storm its strongest citadels, and utterly overthrow the braggart battalions of Materialism, which have so defiantly insulted the armies of the Living God. The first grand assault is already being made. The moun ains of scientific fallacy and atheistic absurdity are made to tremble before the booming thunders of this new artillery. It is an interesting spectacle to the thousands who watch the battle from afar. How thrilling to those whose martial faces are aglow with expectations of the coming, crowning victory!

The third part of the book, "*Evolution Evolved*," is among the most masterly arguments of the 19th century in defense of true science and the Bible. Its position is consistent with the profession of a scientific theist; its treatment of opponents is fair and impartial, and, at times, even magnanimous; its logic is convincing, and its main arguments, throughout, appear as unanswerable as the pure syllogisms of eternal truth. Wilford approaches and examines the Darwinian, Huxleyan, and Haeckelian theories of Evolution with a candor that leaves no room for jugglery, and

* The writer has no disposition to dissent openly from what seems to be the teaching of the Heid. Catechism, Qu, 26. He would only express his sympathy for the venerable little book, in its unfortunate scriptural reference to which the doctrine is made to look for inspired authority and support. Rom. 1: 20 and Heb. 11: 3 are the very passages relied upon, with confidence, by those who teach that God did *not* make all things out of nothing, but out of "the invisible things;" "So that things which are seen, were not made of things which do appear, but (inferentially) of things which do *not* appear." And it was probably the evident teaching of such passages as these, together with his scientific acumen, that led the eminent Christian scholar,—Rev. Joseph Cook,—to affirm: "*It is not my belief that everything was created from nothing.*" *Lectures on Heredity*, p. 121. "All things finite were created. From what? From nothing? No. Is matter an effluence of the Divine Mind? In one sense, yes." *Heredity*, p. 189.

handles them with an ability that has no need of fallacious reasoning. Darwinism is analyzed in a manner that reveals its inconsistencies, and exposes its self-contradictions. Under the unimpeachable testimony of facts it is shown to be unworthy of respect. When weighed in Wilford's new balances it is found equally wanting in truth, reason, and common sense. Absurdities are made to shoot out at every joint. These are shown up in a manner sufficiently ludicrous to make the monkey laugh at the predicament of his pitiable posterity. The "Spontaneous Generation" of Prof. Haeckel is brought under the calcium light of such a thorough examination as to expose the weakness of its miserable pretensions, and tumble it into rubbish by the weight of its incoherencies. The "moneron," which the materialistic Professor exalts to heaven, and places upon the throne of Creative Omnipotence, as the primordial parent of all organic existence, is thrust down to the most unscientific hell. The laws of "Ontogeny," "Philogeny," "Biogeny," and "Embryological Development," including the "Little Human Tail" of the big German scientist, which have been relied upon as of so much importance in bolstering up a baseless theory, are examined, and found to be subversive rather than supportive of a system which is equally destitute of head and "tail." Darwin's hypotheses of "Pangenesis" and "Gemmules" are subjected to a merciless mathematical test, which leaves the reader in doubt as to whether the laugh ought to come in or the pity come out. Our author then shows conclusively, that while the "Missing Link" is so earnestly sought after by Evolutionists, as something so absolutely necessary to the consistency of their claims, its very absence chants hallelujahs of praise to the God of true science and Revealed Religion. The doctrines of "Natural Selection" and "Survival of the Fittest" are unmasked, analyzed, arraigned upon the charge of false pretense, convicted upon the testimony of their own witnesses, and scientifically damned.

Having thus fairly and fully shown that the Evolution theory of Darwin and his collaborators is simply a system of superlative silliness; that their one redeeming trait is ignorance of scientific facts; their fundamental fault an unwillingness "to retain God in their knowledge;" that their merited retribution follows according to the ordination of Him "who gave them over to a reprobate mind to do those things which are not convenient" (Rom. 1: 28),—our author introduces his own hypothesis as the key which is to open the store-house of Nature's ten thousand mysteries. He speaks; hear him: "I lay down the position, without the fear of its ever being successfully met, that no substantial effect can be produced on any object without an absolute substance of some kind connecting the cause with the effect. . . . . I conceive it a principle of philosophy that life and mind are substantial entities as really and truly as are the most ponderable physical objects." Page 494. "I believe that until this great underlying truth shall be duly comprehended and recognized, physiologists, with all their laborious and histologic researches, even with the most powerful microscopes to aid them, will never penetrate even the cuticle of science as regards the true cause of physiological phenomena." Page 466. "As organic life is a substantial entity and could only come from a pre-existing fountain of life,* hence the solution is clear that the life and mental powers of every organic creature originated primordially as infinitesimal atoms of God's own self-existent, vital and mental being; and thus it becomes as naturally and consistently a scientific solution of the origin of life as that the existence of God [as the author claims to have shown on page 444] is an unavoidable scientific truth." Page 472.

Holding that the above position is scientific without being unbiblical, and alleging that the assumption of its truth will answer more difficult questions, and solve more phenomena in Nature than any other hypothesis ever advanced, Wilford claims the respectful consideration and earnest co-operation of all who may desire to go up, under the leadership of this new Joshua, to drive out the atheistic Canaanites and possess the scientific land of promise. He also intimates, very clearly, his desire to receive no recruits except those who are willing to burn their ships behind them, and demand an unconditional surrender of the Evolution army. His watchword is: *No compromise with Godless Materialism.* Evolution as taught in Europe and echoed in America is an abomination of desolation standing in the holy place. While agreeing in the main with those thorough scholars and radical thinkers,—Rev. Joseph Cook and Dr. McCosh,—he doubts both their wisdom and courage in accepting Evolution with certain theistic modifications. He thinks that the great Boston lecturer and the President of Princeton College have pursued a course that appears more like beating a parley with the opposing forces than it does like battling bravely with the Gogs and Magogs of modern infidelity.

The second part of this radical and revolutionary book is a treatise on the *Evolution of Sound*, embracing 260 pages, and, as not necessarily essential to its completeness, ought to have been attached as a very valuable appendix, rather than allowed to break in upon the very heart of the main subject more directly under consideration. It is unquestionably a specimen of the most interesting reading ever offered both to the scientific scholars and intelligent thinkers of any age or country. The author charges that the prevailing theory of "sound" is absolutely unsound. More; he is in danger of proving every charge alleged in the indictment. It would be impossible, in the limited space allowed for this paper, to give an adequate idea of the author's demonstrative arguments against the theory so successively and successfully assailed. The writings of the three leading physicists of the age—Tyndall, Helmholtz, and Mayer—are examined, and their theories, when turned against themselves and against each other, are found to be crooked enough and hollow enough to dispense with the service of rams' horns in trumpeting down the walls of this unscientific Jericho. He points out scores of inferential suppositions to which the current wave-theory stands committed, and which, in common consistency, its advocates are bound to defend, and then shows that they are superlatively ridiculous.

A few of the implied teachings necessarily involved in the undulatory theory of sound may here be mentioned, if for no other purpose, to afford a little seasonable merriment. 1st. The current theory compels a cricket to chirp and churn four cubic miles of atmosphere, whose

* "I suppose Almighty God *evolves* the seen Universe of matter and the unseen of finite force *from Himself.*" Joseph Cook on Heredity, p. 121. "He has given a substance to the soul; He has given a substance to matter. The two substances, we say, are utterly unlike. There is one thing in which they are common: they have the same origin." *Heredity*, p. 183.

aggregate weight is 120,000,000 of tons, with the churn-dasher moving "to and fro" 440 times per second, stirring the whole mass into sound-waves, and by its "condensations and rarifications" generate heat enough to add one-sixth to the velocity of sound according to the invented law of Laplace. Page 130. 2nd. The theory requires a locust, whose stridulations can be heard at a distance of one mile by rasping its legs across its wing, to wield a power equal to that of all the steam-engines in the United States. Page 147. 3d. It also compels the poor little locust to beat the "drumskins," or move the tympanic membranes of all the persons who could find standing room within the compass of its limited omnipotence. These "drum-skins" or tympanic membranes, according to Prof. Tyndall (Lectures on Sound, pp. 4, 5, 49, 69), are thrown into vibrations, "once in and once out;" and, according to our author's test of their avoirdupois, 16,000 of them would weigh one pound. Now, if persons enough were brought together to fill the cricket's capacious auditorium, the tympanic membranes in the aggregate would amount to such a ponderous mass of drum-skins as to weigh *two thousand million tons*. This mass of matter must be shaken, according to the laws of mechanical force, or the cricket will be in danger of losing his position as a very important adjunct to the firm of Tyndall, Helmholtz, Mayer & Co. Certainly such a weight of absurdity in drum-skins, and such a caricature on common sense in the name of science, should be enough to laugh the cricket out of countenance, even if it should fail to drive the advocates of the wave-theory from the rickety ramparts of their monstrous imposition.

The author also (p. 105) explodes the magazine theory, by which he shows that *it is not the thunder which strikes and kills*, as the apostles of sound-waves actually teach. He makes the following quotation from the writings of Prof. Tyndall (Lectures on Sound, p. 23), in which that learned physicist is made to suffer most terribly by the explosion which he describes:—"The most striking example of this inflection of a *sonorous* wave that I have ever seen was exhibited at Erith after the tremendous explosion of a powder magazine, which occurred there in 1864. The village of Erith was some miles distant from the magazine, but in nearly all cases the windows were shattered, and it was noticeable that the windows turned away from the origin of the explosion suffered almost as much as those which faced it. . . . . Every window in the church, front and back, was bent inwards. In fact, as the *sound*-wave reached the church it separated right and left, and for a moment the edifice was clasped by a *girdle of intensely compressed air*." Following this quotation, in his usual, vigorous and confident style, our new physicist calls upon his readers to observe that "no distinction is even hinted at" between "the girdle of intensely compressed air," caused by the sudden generation of gas, and the "sound-wave" (?) which appeared to accompany the concussion. The announcement is then made in the language of no *uncertain sound*, and the implied challenge is confidently laid at the doors of these world-renowned acousticians, and fearlessly flung across the pathway to every seat of scintific investigation throughout the world, that "*the condensed air-wave, or atmospheric concussion, which breaks a window at a distance from an explosion of powder will be found, when tested, to be altogether a different effect from the sound produced by the same explosion, and that* [the air-wave] *will also be found to travel at a different velocity, which velocity will be in proportion to the quantity of gas added, and the distance the condensed wave has traveled.*" From the above it does appear, at this writing, that the author has wisely chosen the field upon which to test the relative strength of the two opposing theories in the science of acoustics. The case involves, at least, an important principle of science, and is likely to evolve the impending conflict. Upon whose banner shall the bird of victory perch? Just think of Miltiades with his little band of fearless friends rushing down upon the battle-plains of Marathon to meet the marshalled millions of a benighted continent! There is intense anxiety in the minds of many. Leverrier was justified in his prediction, based on mathematical calculation, concerning the existence, location, and discovery of Neptune. Is Wilford to be sustained by the truth of his scientific prophecy? How unequal, in appearance, the opposing forces! Is the current wave-theory of sound, with its prestige and popular following, to seek our young philosopher's life and destroy it, or is our Hercules to reach from his scientific cradle and strangle the old dragon of unscientific fraud?

Passing through the system for the purpose of pointing out a few of the absurdities to which it stands committted, Wilford takes up the tuning-fork and strikes it against a resonant body and throws its prongs into tremors. Then, conceding the correctness of the estimate of their aggregate velocity to be about 8 feet per second, he asks the scientific world, with an air of triumphant exultation, to point out the man of scholarly reputation who will have the recklessness to say that the air-waves thus started off at the rate of 8 feet per second have power to increase their velocity 120 times, and travel, after leaving the prongs or resonant body, as sound is known to be transmitted, at the rate of 1120 feet per second. But the supreme absurdity of this *argumentum ad ignorantiam* is made to appear in its most unscientific nakedness when our author shows that the wave-theory of sound is bound to operate by wooden-waves, glass-waves, and iron-waves, and with increased velocity, whenever sound is transmitted through these material substances. Is the scientific world ready to admit the truth of what is here criticised? Are the advocates of this old doctrine of transmission by air-waves ready to say, over their own signatures, that sound, in passing through a rock, or a mountain of iron, actually throws the whole mass into such vibratory motion as to cause the particles to move "to and fro" into "condensations and rarefactions," causing each atom of such material bodies to change its position 440 times per second? If not, will some one please step forward and answer this juggler in a manner that shall in the future keep him back from presumptuous sins, and forever paralyze the spluttering pen of this pestilent fellow, who seems to be a setter forth of strange doctrines? In the meantime Wilford has a right to be heard; and it is predicted that he cannot be hissed from the stage because, forsooth, he has the courage to say to that most popular heresy: so far shalt thou go and here shall thy *waves* be stayed. No wonder that his whole resonant being is shocked into tremors of vibratory indignation as he analyzes a fundamental fallacy, which, for ages, has been palmed off for truth upon the credulity of mankind, and is still taught for science amidst the startling discoveries and intellectual achievements of the 19th century.

But Wilford Hall is not a philosopher of the pessimistic school. Having torn down the edifice of error, he proceeds to build the temple of truth. Having shown, as he believes, that the undulatory theory of sound is made up of contradictions and inconsistencies, embroidered with innocent ignorance of Nature's laws, he introduces his own hypothesis of *corpuscular emissions*. Here, as elsewhere, in the line of the main argument throughout the book, his modern *monad* is brought to the front. Sound is a substance as really and truly as odor, heat, electricity, magnetism, gravity, or light.

He denounces "molecular motion" as an instrument of nimble jugglery when used as the convenient scapegoat of false reasoning. Here Wilfordism must stand or fall. The new theory of sound starts with the assumption of such a substance. From this point it must run the gauntlet to early defeat or final victory. The theory may be obliged to lay aside some weights which do not belong to its essential constitution, and some besetting sins which adhere as the results of its founder's fallible nature; but in the end it will reach the goal and triumph gloriously. If, however, it should fail in the race, or fall in the battle, it will, at least, have made a valuable contribution to the cause of true science, in having shown that the wave-theory stands impeached by the testimony of unanswerable facts, and must, sooner or later, fall before the irresistible force of its own manifest inconsistency.

No adequate idea of the author's position can be given by quoting from or commenting upon this masterly treatise now challenging the attention of the scientific world. The law governing the generation and propagation of sound, as understood by our philosopher, is stated on page 93, and is as follows: *It is not the mechanical effect of the numerous short motions back and forth on the surrounding air which generates the tone of a fork or string, but it is the molecular effect of the sudden stops and starts on the atomic structure of the instrument itself, causing thereby the emission of the substantial pulses we call Sound, while the atmosphere, wood, water, or iron through which they pass, is but their conducting medium,—any motion of such medium, caused at the time by the vibration of the sound-producing body, being but incidental.* The foregoing is enough to show that the new hypothesis is at least different from, if not superior to, the old theory. In this new departure he has broken with much that enters into the popular teaching of the age, and it will not be considered strange if he should fall under its most furious assaults. No established theory of science, true or false, has ever been known to surrender without a struggle. It is therefore a matter of most thrilling interest to those who are standing tip-toe on the promontory top of scientific inquiry to know just what the advocates of the old theory may, can, or must say in their attempts to defend their system against the charge of absolute emptiness. Will they keep silence? or will they say that Wilford is an unscientific crank,—a root out of dry ground,—because, forsooth, he does not come before the world badged with the titulary toys of scholastic favoritism? While he is sapping the foundation and thundering at the gates of their ancient (air) castle, will they attempt to "laugh a siege to scorn," or continue to maintain their significant reticence, in the hope that he may soon pass into obscurity for want of that literary fame which the world so frequently manufactures for

> "The bookful blockhead ignorantly read
> With loads of learned lumber in his head?"

Something must be done. The situation is becoming serious. This man charges us with teaching nonsense for science. What is worse, he is about to show that the accusation is founded in truth. Be we men, and suffer such dishonor? What is our crime that he should tell us so much truth when we are so unwilling to receive it? Simply this: "After the manner which he calls heresy, so worship we" at the unscientific shrine of our fathers. Our wave-theory is older than the Christian era. Is that not saying enough in its favor? It comes "thundering down the ages," and although "its intensity decreases as the square of the distance," its tones are yet sufficiently loud to blow the bugle for a countercharge. In passing upon the relative merits of competitive theories in science, Wilford seems to overlook the opinion of many that age and popular indorsement ought to be taken into consideration as of more primary importance than mere truth, demonstrative argument, and absolute certainty. Then what is still more humiliating to us of the orthodox persuasion is the absence of all testimony that he has ever graduated in any regular college, or cantered over the curriculum of a university to the laurels which have already commenced to enwreathe his brow. True, he gives abundant evidence of more than ordinary natural ability and intellectual attainments; a close student of Nature; a bold adventurer in his search for truth; a match for any man who has yet dared to meet him on the field of scientific controversy; yet we are not aware that he has a diploma, and we are quite certain that he has never been applauded by a Boston audience in Tremont Temple. If we must abandon the sacred old theory to which we are bound by every tie of mistaken friendship, and to which we are committed by every consideration, except that of fidelity to truth, for a new gospel in science, which neither we nor our fathers have known, let us, at least, have an evangelist whose lineage and literary prestige shall heal our wounded pride and palliate the pains of our prejudice. If we may not have an apostle from the Chair of Natural Philosophy in the Royal Institution of Great Britain, nor a leader like Professor Helmholtz from Berlin, nor a celebrated acoustician like our own American scholar, Alfred Marshall Mayer, give us some other star of acknowledged magnitude and lustre to go before us out of Egypt; but as for this modern Moses cradled in the bull rushes of obscurity—this Wilford Hall we will not—well—

Seriously, something *must* be done. A gentleman at the writer's elbow, with more modesty than money, seriously contemplates a donation of $10,000 towards the endowment of a Professorship of Physics, with special reference to instruction in the department of acoustics in some college or university of learning in America, whose faculty will unanimously step forward first, and, over their own signatures, in the columns of this *Review*, successfully defend the wave-theory as taught by Tyndall, Helmholtz, and Mayer, and echoed by the standard acoustical text-books and most popular institutions of learning throughout the world. The defense of the old theory must consist in part of a reasonable answer to the many objections urged against the undulatory doctrine, by A. Wilford Hall in his *Problem of Human Life*. Until such a warfare, defensive and offensive, shall have been success-

fully waged, there can be no security that the strong man, who has been keeping his palace since the days of Pythagoras, can continue to possess his goods in peace. If, after a thorough discussion in this *Review*, as to the relative merits of the two theories, the question should still be left in doubt, the matter may be referred for final decision to a class of common-school boys, or to any jury of scientific scholars who have not been deprived of their literary manhood by the blind tyranny of arbitrary scholasticism. The above project is not meditated in the pains of plethoric purse, neither in the spirit of blunt, bluff, nor bluster, but from the fear that much now taught for "Sound" is only noise about something very *un*sound, and from a desire to

> "Let truth be seized wherever found,
> On heathen or on Christian ground."

It remains, to many, an unsettled question, to which the scientific future alone can give a full and satisfactory answer, as to what part this new philosophy shall play in the coming, closing scenes of the world's intellectual theatre. One thing, however, is already a noticeable fact: the doctrine, be it true or false, is making many converts. Recruits are falling into line without much beating of the drum. Few books have left the American press to meet a warmer greeting than *The Problem of Human Life*. These greetings and recommendations have been given by a class of Christian and scientific journals not quoted in the market of commercial literature. Many of them are even extravagant in their flattering testimonials of approval. Thousands of intelligent thinkers have voluntarily forwarded to the author their expression of delight in the reception and reading of the masterly work. Professors in some of our colleges, and in some cases whole faculties, have announced, after experimental tests, the correctness of some of Wilford's new discoveries, and their willingness to do proper penance in the future for having taught fraud for science in the past.

But our philosopher must not expect to enter the paradise of immortal fame, except through the purgatory of persecution. Others have passed that way before him. Columbus was treated with indignity by the Old World because he had discovered new realms beyond the ocean. Galileo was imprisoned for teaching some of the very truths which have since been formulated into a section of the world's scientific creed. Harvey lost his medical practice because of his great physiological discovery. Jenner's prophylactic contribution to medical science was first denounced as diabolical; soon after an attempt was made to rob him of the merits of his invaluable discovery. So must Wilford prepare himself for the baptism with which other advanced thinkers have been baptized. This, no doubt, he expects. He is too much of a philosopher not to anticipate the inevitable. Ignorance and prejudice will, as usual, seek to obstruct the purest streams of the world's scientific onflow. Already have the mutterings of disapprobation been heard. Sharp criticisms have been made upon the author's philosophical position, and exceptions have been filed against some of his arguments and conclusions. He is charged with "Materialism" and "Pantheism." These criticisms and charges have, in the most important cases, led to correspondence and controversy, in which the critics were either converted or driven into sullen silence. Professor Tyndall has written from London that "it is an infinitely amusing book." Yes, and it will probably prove to be infinitely more amusing in that great hereafter, which seems to be close at hand, when the wave-theory of sound and the Ptolemaic system of astronomy, with many other exploded fallacies, shall be entombed together in the one family vault of merited oblivion.

In the meantime, let the vanguard of the world's brightest intellect move on, accelerated by the momentum of its own progress, and stimulated by the beneficence of its own achievements, until it shall be glorified in the vindication of the Christian Scriptures. And another book was opened, which is *The Problem of Human Life*. Out of these books let the dead theories of the past and present be judged. May their contents be properly understood in searching for the substance of things hoped for, and their suggestions lead through more legitimate efforts, to realize the sublimest possibilities involved in the dignity and destiny of man. Then shall the students of Nature and the disciples of Revelation learn war no more. Science and Religion shall robe themselves in the garments of truth, not only to minister as priests at the altar of the Most High, but also, as heaven's anointed prophets, proclaim throughout the land, and unto all the inhabitants thereof: Hear, oh Israel, the Lord thy God is one God.

OIDAL THEORY OF SOUND.—No. 2.

BY PROF. H. HOWARD.

It is here claimed that matter is inert and that its particles and masses are enfolded and moved by energy supplied through the ocean of force. The particles of matter must have to a small extent at least a unity of motion and collision with the molecules of force and so modify sound-impulse and resonance. The tone of sound as soft, or harsh, etc., may therefore indicate the condition of the force disturbed as outside of solid bodies and receiving a shock from explosion or otherwise; or as force exerted in uniting the particles of a certain sort or form of matter.

The form of force called an *Oid* which surrounds a body as a reinforcement of the energy that fills it appears to correspond in extent and energy to the sum of the force and of the matter composing a body. The sound-conducting capacity of a solid body appears to be in proportion to the force which unites it and to the extent and the density of its oid. Of inanimate bodies the metals mainly have the greater oids, and these are the more sonorous and also the better conductors of sound. In connection with most wind-instuments of music the oid as it extends from the internal surface of the instrument is probably compressed upon itself, and thus a greater number of the molecules of force collide within the instrument. The flaring form of some of those instruments, as also of bells, serves to bring a larger volume of the ocean of force to share in the initial resonance. This is true of the fireman's trumpet through which the volume of the initial sound-impulse is increased and the pitch lowered. The pitch of sound may also be perceptibly lowered through increase of its volume by passing a long distance through open space.

But has the air anything to do with souud? Yes. As the particles of a solid or of a liquid partake of the action of the force which unites them, so do the particles of gaseous matter like the air move and collide with the molecules of force that

hold them, as the ocean of air is moved in the ocean of force. The resonant and sound-conducting properties of the air depend partly upon its density. The earth-oid and therefore also the air is denser nearest the earth's surface. The air is also a better conductor of sound when through the oids of its particles it is condensed by cold. Often when the molecules of force hold a larger proportion of moisture with the air its sound-expressing property is increased. It is probable that the material organs of hearing need to be impressed by a material touch and that the gaseous particles of the air touch the tympanum of the ear as with the hammer-blows of disturbed molecular force. But to complete the connection of the hearing mind with a sound-impulse, the organs of hearing and also the nerves and the brain are permeated with the same sort of force which transmits the sound. In another article it will be shown that the oids of our bodies and also the spiritual oids of our minds are in contact with the force which transmits sound. It is through our dual person-oids that (through the wide difference between mind and matter) the mind grasps matter and receives impressions from it.

Bodies differ widely in their sonorous qualities and in their sound-conducting properties. But this density in bodies as an obstacle to the harmonizing of a theory of sound with its phenomena vanishes when it appears that essential or molecular force, as it holds all matter in its grasp, is the necessary and constant medium through which sound is produced or transmitted. In connection with a solid body initial sound is produced at the surface of the body. A slight scratch with a pointed instrument upon a piece of timber may be heard at the distance of many feet along its length if the ear be close to the timber. The distance the sound may be so heard will be increased in proportion to the solidity, size and cleavability of the timber. The sound is transmitted most along the line of the greatest density of the oid at the surface of the wood. The sound will travel farther along the larger and more solid timber because the surrounding and reinforcing oid is greater and therefore more dense at the surface of the timber.

Some persons are conscious of colors connected with sounds. This "Color-hearing" may be explained summarily as follows:

The methods of energy in producing heat, light and sound are so inseparable that the manifestation of the energy of sound is also the production essentially if in a less degree of the energy of heat. Every sound-producing shock evolves heat, as does any compression of molecular force either within or outside of solid bodies. These appear to be also a fixed interfusion of the forceful essence of the two energies of heat and light. We therefore conclude that our powers for seeing and hearing are so correlated with one another and also with the methods of essential force that a mind of suited susceptibility may perceive light in colors as it is partly developed through the methods of energy for producing and transmitting sound.

Some of the color-hearers perceive a distinct color together with each note in the scale, the darker colors with the lower notes, the lighter with the higher. Whether this perceiving of the darker colors with the lower notes and vice versa be analogous to the rays of the solar spectrum may be for further investigation to determine. But however this may be, we place "Color-hearing" with a class of phenomena indicating that heat, light and sound are transmitted through the one essential force, which as an *Oid* surrounds each body, being reinforced from the *Great Oid* or the ocean of force through which all matter is *existed*.

THE DOUBTER'S PRAYER.

[BY AN EIGHTEEN-YEAR-OLD BOY.]

Saddened and softened by the whirling flood
Of doubts, anxieties and troubled thoughts that beat
And surge in my tired brain, I stand and look
Into the trackless, shoreless ether which contains
Th' unnumbered secrets of Creation's handiwork—
The realm of vacant space and undisturbed repose—
Of emptiness and all that is intangible,
And, as I look into vacuity, there comes
Into my goaded mind a question which recurs
When'er struck with that superstitious awe which fills
The breast when one is brought to face the infinite,
I gaze into the blue, unclouded, pathless vault above.
Can it be true that the departed spirits now,
Of those whose visible, material forms, on earth,
Flooded with warm love the hearts of us poor worldlings,
From the effulgent heights of their elysium,
Look down in pity and in loving tenderness
Upon the toiling, careworn tenants of the earth?
O, Spirit of the unknown heavens! Is it true
That graves and sepulchres are only trophies of
The airy spirits that have burst the vision gate,
And only work the ruin of the carnal clay?
O, Ruler of the never-setting sun of Time,
Creator of the greater and the lesser worlds!
I, thy poor creature, humbly at Thy altar bow,
And with submissive but with longing lips do cry
To Thee; This single mystery reveal to me—
Is there an immortality for humankind?

LEBANON, PA.

RELATION OF BEAUTY TO INSECT FERTILIZATION.

BY SAMUEL Z. BATTEN.

Among the phenomena which natural selection claims to explain is that of beauty or conspicuousness in flowers.

Mr. Darwin says: "Flowers rank amongst the most beautiful productions of Nature, and they have become, through natural selection, beautiful or rather conspicuous in contrast with the greenness of the leaves that they might be easily observed and visited by insects. I have come to this conclusion from finding it an invariable rule, that when a flower is fertilized by the wind it never has a gaily colored corolla . . . We may safely conclude that, if insects had never existed on the face of the earth, the vegetation would not have been decked with beautiful flowers, but would have produced only such poor flowers as are now borne by our firs, oaks, nut and ash trees, by the grasses, by spinach, docks and nettles." Now will this account for the beauty and conspicuousness of flowers, as Mr. Darwin claims? That there are beautiful flowers which are *generally* fertilized by insects, no one will deny. That there are less showy flowers which are usually either wind or self-fertilized, is also true; but will all this give any satisfactory solution of the presence of beauty in flowers?

In drawing conclusions from a number of known facts, it is well to heed the advice of Bacon, and attend as carefully to negatives as to affirmatives. Huxley said, and no doubt but that he carefully weighed each word, "Every hypothesis is bound to explain, or at any rate not to be inconsistent with the whole of the facts it professes to account for; and if there is a single one of these facts which can be shown to be inconsistent with the hypothesis, such hypothesis falls to the ground, it is utterly worthless." Will the hypothesis formulated by Darwin explain all

the facts it professes to account for, or can any be adduced which are positively inconsistent with it?

If this hypothesis proves anything, it proves that *all* conspicuous flowers have become such through natural selection, that "they might be easily observed and visited by insects, so that their fertilization might be favored." While it may be "an invariable rule" that when a flower is fertilized by the wind it never has a gaily colored corolla, is it also "an invariable rule" that when a flower has a gaily colored corolla it is insect fertilized?

If we can find conspicuous flowers which are in nowise beneficial to the plant, in attracting insects, we have found one negative instance. It might be difficult to show that insect fertilized flowers invariably produce more seed than self fertilized. The Bee Orchis is the only Orchis which is self fertilized, and it is none the less showy, neither does it produce less seed than any insect fertilized flower of the same order.

The *impatiens fulva* produces two kinds of flowers, beautiful, showy flowers, which ripen seed but rarely, and very small flowers which are early fertilized, and whose floral envelopes never expand, and yet these latter produce by far the greater number of seed. Another familiar instance of this is seen in our common Viola. Many species produce beautiful fragrant flowers early in the spring, and these ripen but few seed. Later in the season inconspicuous buds appear which are usually concealed by the leaves. These buds do not even develop petals, but are fertilized in the young bud, producing pods which bear far more seed than the beautiful flowers.

Two explanations have been offered to account for these two kinds of flowers; one that they are the more simple and earlier forms of the flowers, the other, that they are degraded forms of the more beautiful flowers. It matters not which explanation we admit to be the more plausible. Both are antagonistic to natural selection; for according to one, increase of beauty has been followed by decrease of utility, and according to the other, decrease of beauty has brought increase of utility. Natural selection cannot offer any satisfactory explanation for the presence of beauty in these flowers, and the presence of beauty is antagonistic to the hypothesis. Hence, the "hypothesis falls to the ground, it is utterly worthless."

Scientists would do well to consider those words of Lord Bacon: "Man, as the minister and interpreter of Nature, does and understands as much as his observations of the order of Nature, either with regard to matter or mind, permit him, and neither knows nor is capable of more." And Dr. Shedd in commenting on this says: "The function of the philosopher is not to originate truth, but to explain it. He is to stand up before a universe of matter, and a universe of mind, and his office is to interrogate them, and hear what they say. He is not to attempt an exertion of his own power upon them in order to reconstruct them, and thereby put a meaning into them. He is not to distort them, by injecting into them his own prejudices and presumptions; but simply going up to them with reverence and freedom, he is to take them just as they are, and to question them just as they stand, until he gets their answer."

☞ See terms for clubs and agents on the second and fourth pages of cover, and send for circulars.

SPECIMEN PRESS-NOTICE.

[As a sample of the hundreds of kind references to the new volume of *The Microcosm* in the press of the country, we clip the following from the *U. B. Mutual Aid Journal*, Lebanon, Pa.]

THE MICROCOSM.—The first number of volume 2 of this highly interesting and instructive religio-scientific journal, of which A. Wilford Hall, Ph. D. is editor and publisher, made its appearance on the first of August. The first volume has proven a most remarkable success. The first number was issued August, 1881, without a single subscriber, and at the close of the first year it had a subscription list of more than 20,000, about 6000 of whom were ministers of the gospel. Volume 2 starts out under very bright prospects. It has been changed to a regular magazine form of 32 pages, price $1.00 per year. The mission of the *Microcosm* is to combat false theories of science, and harmonize the *facts* of science with Divine Revelation, and most nobly is it doing its work. Following in the wake of that master production of its editor, "*The Problem of Human Life*," it pierces with its two-edged sword of *actual fact* and common sense, many of the gorgeously painted balloonistic theories of speculative scientists, producing their most inglorious collapse. No live thinker can afford to do without the *Microcosm*. Send the price to Hall & Co., 23 Park Row, N. Y., and receive a monthly publication the perusal of which will awaken thought, afford pleasure and enable you to see new beauties in both Nature and Revelation.

THE DIFFICULTIES OF PHYSICISTS.

BY REV. PROF. STEPHEN WOOD.

J. B. Stallo in a work styled *Modern Physics*, in speaking of the nebular hypothesis, closes the article in these words; "The enthusiasm for the nebular hypothesis, was in this respect an ontological survival. And in another respect it was even more than that,—it was a recrement [spume or foam] of ancient traditions, about the origin of the universe from nothing. The original mist of the nebular hypothesis is assumed to be of extreme tenuity—of a density less than the one hundred thousandth part of hydrogen, the lightest gaseous body known to the chemists. By reason of this æthereal subtilty, it was readily substituted, in the conceptions of the popular mind, for the old void, from which the world was said to have emerged; and in the imaginations of those, who look upon matter as a sort of inspissation [a thickening] of mind, for the universal antemundane impersonal spirit. It thus conformed to the assumption that, on any hypothesis respecting the mode of the world's formation, it must, in the beginning, have been without form and void, and at the same time, satisfied the mystic yearnings after the æthereal and 'spiritualistic,' which is the special distinction of that large class of philosophers, whose philosophy begins where clear thinking ends."

Wherever this last fling may have been intended, it rebounds with terrific force and disastrous results upon those very clear thinkers, who ignore the "spiritualistic" and commence in the dust and fog—the nebulæ, of infinitely small particles or "solid atoms," forming "a mist of extreme tenuity." This may be where clear thinking commences; but in whatever branch of physical science this leads them, or

whatever theories may be advanced from it, this "clear thinking" always ends in fog more dense than the original nebulae; it is in fact a "clear" case of mind inspissated, or nebulæ condensed.

No one of these clear thinkers who commence with matter and ignore a higher form of substance, and a Creator from whence it is derived has ever been able to give a satisfactory explanation of any of their various theories advanced, or find a stable base for the physical sciences, as now developed. Those who have made themselves familiar with the changes in the organic structure of all departments of physical science during the last fifty years, can probably readily accept the above statement; and those who have not may be convinced by a careful examination of *Hall's Problem of Human Life;* or. Wilford's Microcosm (New York) edited by the same author; or even "Modern Physics" from which the extract is taken at the commencement of this article. I have no objections to a nebular hypothesis, as such; but what I wish to affirm is that the advocates of the different forms of the hypothesis have never been able by it to explain the *cause* of things or even the *form* of things. I shall raise no objection to the term "atoms," but assume that the existence of such creatures has never been proved, and the cause of their existence has never been attempted by what is popurlarly called Physical Science.

J. P. Cooke, says: "Our atoms may be mere fancies, I admit, but, like the magnitudes we call waves of light, the magnitudes we have measured and called atoms must be magnitudes of something, however greatly our conceptions in regard to that something may change. Our whole atomic theory may pass, the words molecule and atom may be forgotten; but it will never cease to be true that the magnitude which we now call a molecule of water consists of two of the magnitudes which, in the year 1872, were called atoms of hydrogen, and of one of the magnitudes which were called at the same period, atoms of oxygen."

I would not willingly disparage the labors of these physicists who have done so much for true science and for man. But the very consideration of their confessed inability to satisfactorily account for the origin of things; and the fact that they have been unable to intelligently explain the laws of the most common phenomena of Nature should suggest modesty when referring to the more circumscribed (?) views of their predecessors. The great difficulty of physicists who have commenced with star-dust, and have left off "where clear thinking ends," is this fact so essential to their calling, namely: they seem never to have comprehended the first great universal law of the formation of physical things—the laws of influx; the mind seldom rising above mechanics.

Stallo says: "The necessity of reducing all physical action to impact, has been a presistent tenet among physicists ever since the birth of modern physical science. And yet, here again, as in the cases discussed in the two preceding chapters, science rises in revolt against its own fundamental assumptions." (*Modern Physics, page* 52). Newton seems to have had a conception of a substance superior to matter, as evinced by his third .etter to Bently, in which he says: "It is inconceivable that inanimate brute matter should, without the mediation of something else which is not material, operate on and affect other matter, without mutual contact, as it must do if gravitation, in the sense of Epicurus, be essential and inherent in it. And this is the reason why I desired you would not ascribe innate gravity to me. That gravity should be innate, inherent and essential to matter, so that one body may act upon another at a distance, through a vacuum, without the mediation of anything else by and through which their action may be conveyed from one to another, is to me so great an absurdity that I believe no man who has, in philosophical matters, a competent faculty for thinking, can ever fall into it. Gravity must be caused by an agent acting constantly according to certain laws; but, whether this agent be material or immaterial, I have left to the consideration of my readers."

Newton's reference to something immaterial raised a tremendous racket among his contemporaries, which caused him, later, to suggest a material medium in (Query 21) these words: "Is not this medium ("an all-parvading ether") much rarer within the dense bodies of the sun, stars, planets and comets, than in the empty celestial spaces between them? And, in passing from them to great distances, doth it not grow denser and denser perpetually, and thereby cause the gravity of those great bodies towards each other, and of their parts toward the bodies, every body endeavoring to go from the denser parts of the medium towards the rarer?" *These difficulties of physicists will never be surmounted until they acknowledge a substance superior to matter*, and discover the laws of *formation*, or the law of discreet degrees, by which motion may be originated not by "impact" but by impulse, and by which material substance may be formed, not by "*inspissation* of mind," but by *efflux* of mind.

How God creates will be the subject of the next paper.

INDECIPHERABLE WRITING.

Why is it that a business man will write a fair, legible hand in the body of his letter, and when he comes to sign his name (the most difficult and important part, and the only part to which no other clue can be got to determine it), he will scratch down a ridiculous scrawl that may mean John Smith, Peter Jones or Tommy Tompkins? We get dozens of just such letters at this office, and no doubt many books and papers go astray for no other reason than that our clerks fail to decipher the proper names. Make it a rule to write all address, including especially your own name as plain as if it were printed, and don't suppose that because you are familiar with the names, other people a thousandmiles away, must be.

A PRIZE ESSAY.

We are pleased to see that our excellent contributor, Prof. I. L. Kephart, of Lebanon, Pa., has just won a prize of $50 by writing the best Essay against the *Tobacco Habit.* The prize was offered by the Rev. W. S. Titus of Charlotte, Mich., and out of sixteen different competitors was unanimously awarded by the judges to Professor Kephart. We congratulate him upon the honor, and our readers upon the fact of having such a worthy contributor to these columns. We may make arrangements for publishing this essay in *The Microcosm*, if it should be desired. The question certainly is one worthy of careful scientific treatment and study.

THE MICROCOSM.

MR. EDITOR: The triumphant career of *The Microcosm* through its first volume, and the hopeful outlook for the second in its greatly improved form, thrills with joy the hearts of its many readers and admirers. Its short career of unprecedented success—the great avidity with which it is sought, welcomed, read, indorsed and commended by many of the brightest minds and most vigorous thinkers of modern times—is proof conclusive that it has a mission—that prior to its induction into the world of journalism there existed in that world a distinctly marked vacuum which it now most completely fills.

Yes, *The Microcosm* has a mission. Prior to its advent there was no periodical that seemed to have either the ability or inclination to take hold of the atheistic theories of science ("Science falsely so called") and expose, from a real scientific standpoint and in a thoroughly scientific and common-sense manner, the assumptions and vagaries thrust upon the world as facts by the self-opinionated and skeptical scientists. These theories and teachings were poisoning the minds of the rising generation, and awakening doubts respecting the teachings of the Scriptures in the minds of older persons, who, for want of a truly scientific education, were not able to detect the flaws in the false theories advanced.

The moral and intellectual world was in great need of a bold, vigorous sheet, conducted by an independent, energetic thinker, who was abundantly able and sufficiently courageous to call in question some of the hypotheses and deductions of materialistic scientists; and in a clear, logical manner, adapted to the comprehension of the masses, demonstrate that, in so far as modern scientific theories conflict with the fundamental teachings of Holy Writ, in so far, at least, are they at variance with the *facts* of Natural creation.

All this, *The Microcosm* has done; and the fact that in one short year, its subscription list has risen from zero to more than twenty thousand, and that it numbers among its readers more than six thousand clergymen, and has received the enthusiastic encomiums and indorsements of scores and hundreds of D.D's; LL.D's; M.D's; college Presidents and college Professors, is proof conclusive that it is occupying and *thoroughly* cultivating a field in religio-scientific literature of the greatest importance. In addition to the work it has done, as above indicated, by assailing and exposing the absurdities of theories which have been for many years taught as real science (the wave-theory of sound and the error in Newton's Law, for example) it has so thoroughly opened the eyes and awakened the minds of thinking men and women, that hereafter a new theory that conflicts with the plain, essential doctrines of the Bible will require something more as an indorsement than the name of a Tyndall, a Spencer, a Helmholtz or a Mayer, before sober-minded men will conclude that it is true, and that the Bible is false. It has so completely exposed the mistakes of great scientists, that it is now vastly more easy to conclude that their speculative deductions, their mere theories of science, may be erroneous when they conflict with Gospel truth, than it is to conclude that the Man of Nazareth was in error. Hence the many hearty "*God bless yous*" that go up for the Editor of *The Microcosm* from sincere Christian hearts.

The world was in great need of such an aggressive defender of "the faith once delivered to the saints." Owing to their ignorance respecting the mysteries of science, the expounders and defenders of that faith were too wont to cringe and cower before any new atheistic dogma of science thrust out by self-consequential materialists. Recognizing the fact that "fire must be fought with fire," and having no knowledge of science with which to confront false theories, they could but stand on the defensive and beat a slow but sure and inglorious retreat before the advancing cohorts of a bold, aggressive materialism.

Thus the fundamental doctrines of Christianity were being obscured by a pernicious infidelity for want of competent defenders, until Wilford Hall, thoroughly qualified by many long years of patient research, like a second David, leaped into the arena in the presence of the atheistic Goliath, and clad in the plain panoply of truth, armed with a few small but solid stones, such as common sense and actual facts, commenced a vigorous assault upon the mighty giant.

The first stone in the shape of the *Problem of Human Life*, smote skepticism between the eyes, and felled it to the ground, so stiff and senseless that it has not since uttered a word or offered a show of resistance. The young David was quick to follow up this decided advantage, and leaping upon the prostrate form of the huge boaster, he wrenched from him his own sword, converted it into a still keener weapon, *The Microcosm*, and with that two-edged instrument has not only cut off the giant's head, but is literally cleaving him into pieces as Agag was hewn by the sword of Samuel.

Yes, *The Microcosm* has a mission, and nobly, grandly is it accomplishing it. Slowly (nay, rapidly) is it ingratiating itself into the confidence and esteem of the best men and women of Christendom. In its new form it is a perfect literary and scientific gem, and from hundreds and thousands of the purest and most highly cultured Christian people of this country is going up daily the devout, sincere prayer—GOD BLESS THE EDITOR OF THE MICROCOSM.—I. L. KEPHART

RELATIONSHIP OF GOD AND THE LAWS OF NATURE.

BY REV. WM. ALLEN.

In common parlance, when reference is made to science, nothing is more common than the mention of the "Laws of Nature." Perhaps many have never thought carefully on these words placed in this manner. We want, as far as we are able in a few brief statements, to show the true relationship of *laws* in the government of the physical universe. Evidently God, who made all things, is greatly concerned in the management of the things He has made. That He performs many of his operations through agencies in the ways of the creatures He has made, and by the laws He has instituted, is not to be denied. But that He can act upon matter without law, in some unseen, undiscerned sense is a great truth. The normal state of Nature is the idea of it we gain when it is regularly controlled by a given set of laws. Miracles are opposing, conflicting actions, in which there is no discernment of general law, but wrought by the immediate hand of God. We may conceive of a time when there was no law. Nevertheless, the Omnipresent God, by means of the immediate attention He has always

been able to give things, was sufficient for all proper management of the physical universe, "God said let there be light and there was light." He made it. In order to utilize it *He* commenced a course of action on it in some mysterious, immediate sense which culminated in what we conceive to be the "Laws of Light." These laws, whatever they are, if anything beyond the *presence* of the Omnipresent God, are as much other creations as light itself.

The attribute of Omnipresence instills a beautiful lesson in the general government of the physical universe. Contemplate it in whatever way we may, *God is there.* He whose arithmetic numbers the hairs of our heads, counts the sands on the sea-shore, and watches with pitying eye the fall of the minutest bird, is immediately present in all the operations of his vast creation. The instant God should withdraw himself from the Solar system, not only the Laws of Light, but light itself would cease to be. Things would gather quickly into that inconceivable chaotic nature which they had before "God commanded and it stood fast;" before "He spake and it was done." There is surely a most beautiful and intimate relationship between God and his government of physical things. There can be no government without God's presence—there may be government without law further than it is contained in the Omnipresent God. *His* resources are ample, full.

It is beautiful to think that wherever there is law, there is God. He has not made the physical universe, given it laws of government, and then gone off, Lycurgus-like, leaving things to take care of themselves. No, He remains present in the laws of his institution supplying every lack. Even the animalcules existing and sporting every where come into being under his eye, nor do they pass away without his notice. It is all simply wonderful and too high for human contemplation. God is everywhere, and much of what we call law is only the Omnipresent God in his continuous action. He made and his presence upholds. Omnipresence is the great supplement of the physical world. Gravity may be, for aught we know, the unseen hand of God in the proper administration of physical government. The universe is vast, but no more so than God himself. May it not yet, sometime along down in the future, be an amusing thought that after the speculations of centuries on physical laws, they are after all only an Omnipresent God giving energy to the things He has made. Who knows? Omnipresence itself forbids the idea of remote law. The energizing Spirit in the universe is God. Those invisible realities which we call physical laws, may be, for aught we know, but counterparts of his own being. God is in the crucible of the chemist as well as in the contemplation of the scientist.

Only granting God's Omnipresence we at once conceive that He occupies the whole physical universe. And we are in some miniature sense what He is in the vastness of a universal sense. While we conceive a similarity, we would not argue a sameness in the two, for what can be like an Omnipresent *being?* There is an energy in man called spirit, life, soul, that controls his corporeal frame. There is a universal energy called the Spirit of God which controls the vast spheres of Creation as well as smaller things in all the departments of Nature. A man *wills* to change his position, and immediately under the laws of that volition, the muscles begin a complicated action as mysterious and incomprehensible as the infinite God himself. What law does a man conceive of here? None except a general life-energy brought into action by the force of mind known as the *will.* Take this as an illustration; God is the soul, the life, the spirit of the universe. Though *He* made them yet He energizes them. All remoteness of law is absorbed in the idea of his *Omnipresence;* God is the universal ocean of life necessary to all other life.

A NEW PHILOSOPHY. SUBSTANTIALISM.*

[A commencement oration delivered June last at Cornell College, Mt. Vernon, Iowa.]

BY T. LINUS BLANK.

This is an age of doubt rather than one of faith. There is a tendency to believe only that which the physical senses recognize. Because the soul cannot be seen and analyzed, many doubts have arisen as to its existence. This age has become so scientific that a mere faith will no longer answer the requirements of its belief. The causes must be apparent, and so natural is it for the human mind to seek a cause for every effect that its investigations have often led to the worst forms of Materialism; from which have arisen the various schools of Evolution—evolution without a design, without a God.

Materialism by its audacious statements has converted science into the cold, lifeless laws of inexorable fate. By its so-called logic, it has poisoned the church with the miasma of materialistic Evolution. With scarcely a struggle has the Christian church surrendered to the onslaught of this mighty foe. But while science and religion have been bowing as ignoble suppliants before this Godless creed, mighty and silent forces have been at work to free them from this despicable bondage. The future may perchance recognize these forces in a new philosophy, under the title of Substantialism.

The Materialism that pervades our sciences to-day is a blighting curse upon the name; it teaches that force is a "mode of motion"; that motion creates that activity we call life, and that from the differentiations of that little albuminous Moneron has come primeval man, and from its initial activities has eventually sprung that wonderful product, the human conscience. But Substantialism teaches that all *force is substance.* That heat, light, sound, electricity, magnetism, gravitation, life, soul, spirit, are all incorporeal, substantial entities; that each is an emanation from that Eternal Being from whom came the worlds, and that out of Himself created he all things, and not "out of nothing." This new philosophy does not conflict with *facts* in the physical sciences, only with *theories.*

Applying Substantialism to the correlation and the conservation of forces, you have substance to correlate and conserve, and not merely a "mode of motion." Applying it to the transmission of heat, light, and sound, you have a real substance to be transmitted, and not simply "molecular vibration." Give them a single property of air and gas, that of seeking an equilibrium, and you will have an explanation of radiation and convection, of reflection and refraction, of echoes and

* Mr. Blank, in this oration, as noticed last month, has happily brought together a few of the salient points, some of them verbatim, of the *Problem of Human Life*, of which he writes us that he is an enthusiastic student.

harmonies. By it the laws of electricity become more simple; by it the powers of magnetism and gravitation become substantial entities; by it magnetism is a substance going out and laying hold of another substance, and not an hypothetical either, reaching out, and by a reflex vibration, moving a solid, veritable body. A body not properly supported falls, but the gravitation that draws one body to the earth is no less a substantial entity than that support which upholds another body; the relative strengh of each is measured by the pound.

The science of life, physical and spiritual, is rational in the light of this new philosophy. The materialism of Haeckel makes life the result of designless activity; the theism of Beale finds life in the intelligent bioplast weaving the organic structure; but whence the life of this little bioplast? a question long mooted by scientists and logicians. The materialist says it came by spontaneous generation, while the theist says by the will of God. The former annihilates the barriers between the living and the not-living by bold assertions, the latter by faith in a creative will.

But regarding life as an incorporeal, substantial entity, which by laws of Divine control enters into and permeates matter, you have a rational explanation of all living organisms. With this substantial life as the cause of every activity, death would not end all, even at the stern hands of logic. As something cannot be from nothing made; so nothing cannot be from something made. Thus, the animating principle that once permeated that lump of clay, has not ceased to exist; it has only withdrawn its active energies from that lifeless form and passed with the soul to other spheres of activity. From this may be deduced a theory of Theistic Evolution, one that will magnify and honor, and not ignore and belittle our Maker.

It is a universal law of Nature that plants and animals were created to bring forth seed, and not the seed created to produce the first primeval parent. With this law recognized and obeyed, Atheistic and Agnostic Evolution must be abandoned. Each new species that seem to spring spontaneously into being, is not the offspring of a lower form; but the Divine power of the living germ enables it to enter into the lifeless clay, and move it to activity; then that life builds up and assimilates, until there is produced a self-propagating parent. The elements necessary to this assimilation may be prepared by the existence of previous forms of life, but the evolution which teaches that the existence of one species prepared the earth for the growth and development of a higher, is in happy contrast with that theory which teaches the elimination of man by a differentiation of a "Carbon god" existing according to Haeckel, prior even to the carboniferous age. An anology to sustain the theistic evolution of animals, is found in the spontaneous growth of plants. A Canadian forest is removed, and in its stead springs another, entirely foreign to that clime, but the matrix was ready for the reception of this incorporeal, substantial life entity, and it sprang into physical being.

As the new philosophy is carried into the realm of soul and spirit, there is suggested the idea of Pantheism. But Pantheism teaches that Nature is God and God only, while Substantialism makes all forces but the effluence of the Divine Nature. All these substantial entities are but atoms of the Great God who rises above, rules over and controls them all. Substantialism is pre-eminently theistic. Its plan is unific for all forces; it reduces all mysteries to one unknowable, eternal mystery—a self-existing, Infinite God. To know that many mysteries have existed, you have but to ask the question, what is life, soul, or spirit? The vagueness of the answer is perplexing and the inadequacy of the conception baffles your credulity; you wonder what you are, whence you are, and where you are going. The substantialist tells us that these vital principles are all substantial entities, self-conscious and eternal, and in his worship of Jehovah he conceives of Him as a personal organic entity, who hears, sees, and feels, and who is Omniscient, Omnipresent, Infinite and Eternal.

THE NEW YORK INDEPENDENT.

We are hearing from the clergy in all parts of the country in response to our rebuke of the Editor of the *Independent* in the August *Microcosm.* The universal verdict is—"Served him right." Many of these writers say they had intended to subscribe for the Independent, but that our article has changed their minds. Rev. E. O. Norville, of Gilson, Ill., one of that *impenetrable's* "ignorami" who reads the *Problem of Human Life*, writes: "I have the first number of the second volume of *The Microcosm*, and I am more than pleased with it. It is simply *grand!* Will do all I can to extend its circulation. Put my name down for the reprint of first volume of *Microcosm* in book form and for *Universalism Against Itself.* Have sold 24 copies of the *Walks and Words of Jesus.* I was about to send for the N. Y. *Independent*, but shall not do so now. I am afraid of a man who will condemn a book without reading it. Such a man is not a safe guide."

CORRECTIONS OF ERRORS.

It is impossible to conduct an extensively circulated publication or attend to filling orders for books, in answer to a large number of correspondents and agents, without some errors occurring. Should any error either in sending books or papers occur, we will take it as a favor if any subscriber or agent will notify us, and we will at once do our best to rectify it. We must say, however, judging from past experience, that most of the failures to receive books or Microcosms by our patrons result from losses in the mails, or pilfering from them by conscienceless parties who find this a cheap way to obtain valuable reading matter. We are not alone in this experience. All publishers are more or less annoyed in the same way.

REV. PROF. S. B. GOODENOW.

We have a very concisely written argument from Prof. Goodenow, aimed still to vindicate a necessity for the fixed tangent of Newton, and as a further explanation of his own diagram and "truer demonstration" published in the August *Microcosm.* Having so much on this subject in the present number we have reserved his explanatory argument for next month, which will appear with our remarks. In the mean time let the reader carefully consider Newton's oversights, and Prof. Kemper's admissions as given in this number of *The Microcosm.*

WILFORD'S MICROCOSM.

23 Park Row, New York, Oct., 1882.

A. WILFORD HALL, Ph.D., Editor and Prop'r.

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DOES DEATH END ALL? No. 1.

No other question so deeply interests mankind individually and personally as the one propounded above; and no intelligent man or woman of the countless millions who have lived and died upon this earth has approached the final change without seriously asking the same question. For thousands of years it has been one of the chief efforts of philosophers and religionists of all schools to give a definite and satisfactory answer to this question, and to establish such a system of intelligent belief, based on such an array of facts, or other rational considerations as would convince persons of ordinary intellects that there is as much a real hereafter to humanity beyond the night of death, as there is a real to-morrow beyond the setting of the physical sun of to-day. It scarcely needs to be said that all efforts to such an end thus far have failed—not wholly, but to the extent of absolute satisfaction on the part of an inquiring mind.

Could we *know* positively that when this body dies that which animates it will immediately awaken in another life with a spiritual body, clothed upon with spiritual vestments, and surrounded by a real spiritual environment as tangible to the soul as is the present environment to the bodily senses, it is manifest that the present state of existence would be a very different thing to that which it now is. With such a future before us clearly defined and rationally assured upon such unimpeachable evidence as to defy reasonable doubt, man could walk erect and smile in the midst of the most exasperating vexations and disappointments, and be enabled thereby to meet the trials and discouragements of life with a serenity that would tend to allay the the very storms which they generate and which would otherwise lead to disaster and ruin.

Is it possible in this life to acquire such a practical assurance of a real existence beyond the present, independent of the ordinary channels of religious faith, as to make the future state a matter of business consideration, as we would anticipate the coming spring-time and prepare for its duties and enjoyments when this winter of our discontent shall have passed away?

We believe that such a degree of assurance on the part of every intelligent man and woman, is the chief and legitimate inheritance which the Creator of our bodies and the Father of our spirits originally intended for us to possess and enjoy here.

We do not claim that the same kind of evidence can be given of a future life as we enjoy of the rising of to-morrow's sun, because the latter is the result of experience in our often seeing the sun to rise and set, and in witnessing the close of one day and the dawn of another. But even personal experience, oft-repeated, is no stronger or more convincing evidence than that which depends upon other kinds of testimony, such as the unquestioned voice of concurrent circumstances coupled with various other rational considerations. For example, we met a friend whom we have well known for years on Broadway yesterday, and conversed with him for several minutes. Of this we have the evidence of our

senses, as well as of years of previous acquaintance. But in point of fact we are not nearly so sure that we met, or saw, or conversed with this friend as we are that there is a real city called *London* which has existed for hundreds of years on the other side of the Atlantic ocean, though we never saw that city and only know of its existence by rational considerations outside of personal experience. The "fool" concludes that there is no God because he never saw one. Yet if God should actually present himself to the gaze of such an atheist he would be more apt to conclude that he had been momentarily out of his senses than to believe that he had seen the Almighty, unless he were really too big a "fool" to reason soundly. So we might be mistaken about having met our friend on Broadway because others have been so mistaken before from momentary derangement of the sight or aberration of the mental faculties; but we cannot be mistaken about the city of London, because its existence in our convictions depends upon so many concurrent facts, evidences, and circumstances that we are necessarily as certain of such a city beyond the Atlantic as we are certain of our own consciousness, which is the only basis of all other classes of knowledge.

We hold, therefore, that the want of personal experience with reference to a future state of conscious being for man does not necessarily detract from the certainty of the evidence in its favor, or the undoubted assurance which we may rationally entertain of such a hereafter for humanity.

We believe that the time has at last arrived in the world's philosophical and scientific progress when man may absolutely *know*, in a most important sense of that word, that the present life is not, in the very nature of things, all there is of us or for us; and that the Power that created and placed us here, with the countless evidences of intelligent design manifest in our marvelous vital, mental, and physical organizations, and everywhere witnessed in our relations to the environment, contemplated more by such existence than to mock human intelligence and to stultify all ideas of Divine wisdom which man is capable of forming. We purpose, therefore from time to time, as opportunity offers, to present brief articles upon this most pregnant theme, of which this forms the introduction.

PROFESSORS KEMPER AND GRAY ON THE MOON.

(Newton's Yardstick Finally Abandoned.)

We have been informed by those who know, that the writer in the *Christian Standard* who assists that paper in its controversy with THE MICROCOSM, and who originally made his mark ("K"), but now signs his name in full, as "Prof. C. J. Kemper," is none other than the distinguished author and professor of mathematics and astronomy in Bethany College, West Virginia. We are right glad to learn this, for it gives THE MICROCOSM new game to bag, that is worth the powder.

But has Prof. Kemper, in his long article in the *Standard* of August 9, referred to last month, really surrendered himself into the hands of THE MICROCOSM, by abandoning Newton's fixed tangent? We most positively assert that he has, and that, so far from helping either Newton or the *Standard*, he has ruined the cause of both, yielding everything that THE MICROCOSM has claimed. Let us now prove this so clearly that every reader of the *Standard*, save, perhaps, its young editor, will see it. First, look at the following sentences which we copy from Prof. Kemper's very cautious and carefully-written article, which the editor in the same issue, innocently and without comprehending its suicidal logic, calls "a little wholesome instruction to THE MICROCOSM." Had he called it a little powder and ball for THE MICROCOSM, he would have figuratively expressed the truth, as will soon be made to appear. These are a few of Prof. Kemper's sentences:

"It is only for *very small arcs* that the tangent deflections are as the *squares of the times.*"

"He [the Editor of THE MICROCOSM] states truly that the space through which a heavy body would fall, free from resistance, was proportional to the square of the time, but made a very preposterous blunder, for a student of physics or elementary mathematics even, in assuming without reason or proof, that the fall of the moon from the tangent *was directly proportional to the time*" [that is, of uniform fall].

"Further, to compare two forces by the amount of space they can cause a heavy body to accomplish in a given time, it is necessary that the *lines of direction* of the force should remain *practically invariable*, and this is the reason why it is necessary to *confine the moon's motion* in the calculation, *to a small arc.* The *line of direction* of the earth's attraction for the moon *practically does not change in a small arc, but does change when we suppose the moon to pass over a large arc.* In the latter case the fall of the moon from a fixed tangent *would not be due to the full force of gravity, but only to one component of it, which component approximates zero as the arc approximates ninety degrees*" [just as THE MICROCOSM has repeatedly urged].

These quotations from the high mathematical authority of Bethany College, we now undertake to show to be the death warrant of Newton's moon demonstration. Look at the predicament of astronomers. To talk as they have heretofore done about this grandest mathematical achievement of Newton, and to write of it as an unparalleled triumph of "pure mathematics," and then to fritter the whole thing down, under

the influence of microcosmic blows, as only "*practically*" correct when applied to "*very small arcs*," and as only a "rough measurement," is a humiliating tumble for mathematicians, unheard of in the annals of science. Who ever heard of this contemptible belittling of Newton's greatest mathematical demonstration, and of this talk about its being only "practically" sufficient as a "rough measurement" of the moon's fall from its tangent, if very favorable conditions be observed, until THE MICROCOSM began to pick holes in Newton's laws, and expose their absurdities to the world? Not one imperfection or flaw in Newton's geometrical formula, upon which that renowned achievement was based, can be found hinted at as the admission of any recent astronomer or mathematician until Newton's laws began to be overhauled in THE MICROCOSM. We challenge the record to produce one such instance. Now all of a sudden, Newton's is "not exactly the correct method" but "a rough measurement," according to Prof. Goodenow, while Prof. Kemper responds—Yes! it will answer the purpose "*practically*" if "*very small arcs*" be employed!

It therefore remains for us to show from Prof. Kemper's own statements that this "rough measurement" will not even do "practically" or at all, however "small" the "arc" he may employ. Let the reader again examine the last paragraph just quoted from his *Standard* article. The Professor there clearly admits that the tangent from which the moon's fall is to be calculated cannot be maintained mathematically at all or for the small fraction of a second, but that it must be changed at every *instant of time* or else it will conflict at once with the "*line of direction of the earth's attraction*!" There can be no mistake as to this admission on the part of Prof. Kemper. Here is the proof. He admits that a "large arc," from which to measure the earth's fall of the moon from the fixed tangent, is necessarily defective because "the line of direction of the earth's attraction" is not directly from the tangent but partly backward, and that this "line of direction" gets worse and worse the larger the arc employed, till by extending the arc the pull *from* the tangent entirely dies out at *zero* or at 90°. Plainly, then, if a "large arc" of the moon's travel is wrong, an arc half as large is wrong in proportion to its size because in just so far it causes "the line of direction of the earth's attraction" to vary from a direct or right-angle pull from the tangent which alone must be a mathematically correct line. This, Prof. Kemper admits, by telling us that with even a "*very small arc*" the "line of direction of the earth's attraction" is only "practically" correct—not mathematically correct!

To enable the youngest student of science to see the force of this argument and the fatal character of Prof. Kemper's admissions, let us look at them in another way. If the "line of direction of the earth's attraction for the moon" in relation to its fixed tangent gets less and less effective as it leaves the start and as the arc is extended, till it ends in nothing at zero, then of course if we begin our measurement at *zero* where there is no pull at all from such tangent, and calculate backward, it is plain that the same "line of direction" gets more and more effective, and nearer and nearer correct till it reaches *maximum*. This maximum can *only* be at the very *start* of the tangent where alone the "line of direction of the earth's attraction" is mathematically correct; and here alone it is without any "arc" at all from which to calculate acceleration, since here alone it is at perfect right-angles to the line of tangentical force! The smallest conceivable "arc," therefore, measured away from this right-angle point takes just so much from the full effect of gravity as relates to a fixed tangent, for in just so far does the line of the earth's attraction pull *partly backward* instead of directly *from* the tangent. Such is the clear admission of Prof. Kemper, and in so admitting he gives up the whole controversy and comes over to THE MICROCOSM as completely as if he had read our reply to Prof. Goodenow in the August number, and unconditionally adopted our views. To prove this, here are our words quoted from page 29:

"That the tangent cannot be fixed or maintained even for the *small fraction of a second*, from which to measure the moon's fall, is manifest, since the pull of the earth's gravity [or *line of direction*, as Prof. K. expresses it] would be *backward instead of at perfect right-angles as it must be all the time in order to produce circular or orbital motion*. Hence, the tangent must be changed *every instant* to keep up this right-angle measurement of pull [or maximum "*line of direction* of the earth's attraction,"] and consequently the fall of the moon from such ever-changing tangent must be an absolutely uniform motion as the work of gravity alone. Hence the correctness of our position that there is no sort of relation or analogy existing between the two kinds of fall."

Prof. Kemper thus having adopted our premises and given up the employment of any "arc," however small, as only approximately or "practically" correct, he is forced also to adopt our conclusion, namely, that the true tangent of the moon, or its rectilinear tendency, must change every instant of time, so that the moon may fall from it constantly under the full force of the earth's attraction. To employ never so small an arc is to vary the direct pull of the earth just that much, while to draw a new tangent for the moon to fall from every second or so, is to suppose the earth's attraction to act on the moon's fall by fits and starts, beginning each arc or

second strong and getting weaker toward its close. But to suppose the tangent to change at every instant of time, and thus keep the "line of direction of the earth's attraction" at its maximum or at perfect right angles to such tangential force, is to keep the moon's fall from the tangent constantly and mathematically uniform and not "practically" near enough to geometrical accuracy to answer the purpose.

Hence Prof. Kemper, as the result of his truthful admissions, is forced to acknowledge that no sort of relation can exist between this uniform fall of the moon from a constantly shifting tangent and the continuous mathematical acceleration of a stone's fall on the earth's surface as long as it continues to fall. What a preposterous idea to suppose the acceleration of the falling stone to be only mathematically correct when limited to small "arcs" or divisions or periods of fall and then to require a new start in order "practically" to keep correct! If there were the slightest similarity between the two kinds of fall, even with Prof. Kemper's improvement of "very small arcs" to help them, the stone's fall must be supposed to continue but a second at a time in regular acceleration, and then begin again, or else like the fall of the moon with a "large arc," according to Prof. Kemper, "the line of direction of the earth's attraction" would lose its hold on the stone and come toward "zero" as it began to approach the earth, thus causing all acceleration to cease! What trifling nonsense, then, to suppose any relation to exist between the moon's uniform fall from an ever-changing tangent under the action of gravity alone, and the stone's direct fall under the same steady action of gravity with the accelerating factor of inertia or constantly accumulating velocity added!

A certain Prof. J. A. Gray prints a long article in the New Concord, Ohio, *Enterprise* against THE MICROCOSM and in favor of Newton's fixed tangent with exactly the same fatal admissions made by Prof. Kemper, and like Prof. K., he fails to see the suicidal effect of his reasoning. He admits in the most unequivocal terms that the full effect of the earth's gravity in pulling the moon from a fixed tangent, can only be exerted at exact right angles, or exactly at the start of the tangent, and that the moment it leaves this start, however small the arc, "*it so nearly receives all of the force of gravity* so as to pull it *directly* away from the tangent that it departs from this tangent in accordance with the law of falling bodies for a *considerable distance*, *fully sufficient* to enable us to compute the *exact force* of gravity at the moon and thereby verify Newton's law!"

Of all the slipshod mathematical nonsense ever published, this takes the lead. It even beats Kemper. Yet this is the kind of aid Newton is getting all over the country against the irresistible arguments of THE MICROCOSM. Prof. Gray has it "*nearly*" correct, or "fully *sufficient*" for a "*considerable* distance" after leaving the start, by which he can "compute the *exact force* of gravity at the moon." That is, compute "exact" results by something "nearly" correct! Yet he admits that the entire or mathematically complete pull of the earth's gravity can only be exerted at the instant of right angles, or at the very start of the tangent and without any arc at all! How in the name of reason can the earth's attraction pull the moon "in accordance with the law of falling bodies," when the *whole force of gravity*, without the slightest diminution, acts on the falling stone at the earth's surface from the very start and as long as it continues to fall? It is subject to none of this pitiable mathematical accomodation of "very small arcs," "nearly" receiving "all the force of gravity" for a short period after it starts, which "nearly" answers the law of falling bodies during that short period, but which immediately gets wrong, requiring a new start of the falling stone, or else it gets worse and worse the longer the stone continues to fall! How monstrous would it be to talk of a stone's mathematical acceleration as "nearly" correct, for a "considerable distance" and "fully sufficient" to determine the law, etc.! Yet this is the way those great professors of astronomy are now forced to talk about the fall from the tangent! Prof. Gray had better go to Bethany at once. Prof. Kemper needs an assistant astronomer whose "considerable distance" and "nearly" correct measurement will help out his "very small arcs" and "practically" pure mathematics.

Plainly, then, no acceleration can occur in the moon's fall for the reasons here given, and as fully admitted by these mathematical professors; and hence it remains true, as THE MICROCOSM first had the honor of announcing that the moon's fall from its tangent cannot be as the square of the time even for a "very small arc," but must be the same in one second as in another second, and twice as much in two seconds as in one second, if mathematically calculated, since the tangent constantly keeps pace with the moon. How empty, therefore, the prediction of Prof. Kemper in the following words:

"He [the Editor of THE MICROCOSM] will never repeat the statement that the deflection of the moon from the tangent is *twice as much in two seconds as in one second again.*"

O, thou false prophet of Bethany! Here it is *repeated* and fully substantiated by your own truthful but unintended admission, namely, that the full force of the earth's attraction in causing

this fall from the tangent can only be exerted at perfect right angles, thus necessitating a change of tangent at every instant in order to maintain such right-angle pull, thereby abolishing all arcs, however small. Hence it remains as clear as logic or fixed science can make anything, that every departure from such absolute right-angle point of pull, however small the arc, involves just that much mathematical error, and consequently that much variance from the law governing falling bodies.

We now ask the pertinent question. If Prof. Kemper has the right to strike a new tangent for each "*very small arc*" of the moon's travel, in order to keep "the line of direction of the earth's attraction" only "*practically*" correct, as he admits, have not we a manifold better right to strike a new tangent for every *instant of time* in order to keep this "line of direction" *mathematically* correct? Q. E. D.

"*Out of thine own mouth will I condemn thee.*"

What can be clearer than the conclusion involved in the foregoing question? If Prof. Kemper can show any reason at all for using a "very small arc" of the moon's travel from which to measure, in order to save the ghost of a fixed tangent for Newton's law, while acknowledging even then that it is only "practically" correct, surely we can show a much better reason for discarding all arcs however small, letting the tangent change constantly to keep pace with the moon, and thus keep the line of the earth's attraction always at exact right angles to the line of tangential force, by which the fall is proved to be absolutely uniform! Thus the idea of a fixed tangent, or any necessity for such a line from which to calculate the moon's fall, is fully exploded by Prof. Kemper himself.

One can but feel sympathy for a great professor of mathematics who is thus forced step by step to present the most renowned demonstration in the *Principia* as based upon a measurement which will "practically" answer the purpose if the most favorable conditions ("very small arcs") be employed! Why not confess, and have done with it, that Newton was mistaken, thus putting it as mildly as possible?

The very thought of eminent professors of astronomy in our colleges and universities contending for the continued life of a demonstration, after admitting it to be but a "rough measurement" which will "practically" or "nearly" answer the purpose and be "fully sufficient" for a "considerable distance" under very favorable conditions, while at the same time claiming it to be the result of "pure mathematics," is a most humiliating spectacle for young students of science to contemplate! "Rough measurements" "nearly" correct may be "practically" sufficient in plain carpenter-work, such as the framing of a common barn, because timbers can be bent or twisted a little to make the tenons fit the mortises; but it remained for Professors Goodenow, Kemper and Gray to startle the scientific world with the announcement that the immortal Newton's most brilliant mathematical triumph is but a "rough measurement," "nearly" right, and that it will "practically" answer the purpose under very favorable conditions! If this is the kind of "pure mathematics" dealt out to the students of Bethany College, then in heaven's name let parents take the hint and send their sons instead to some first-class country school.

We earnestly trust that Prof. Kemper will try his hand again in the *Standard* in defense of Newton's demonstration. He cannot do a better service for the cause of THE MICROCOSM. We pledge him in advance and on general principles to prove that he cannot write one column upon this subject without contradicting himself, Newton, and the other astronomers who have discussed the laws of gravitation. We sincerely hope he will give us an opportunity to make this promise good.

THE GRAVITATION CONTROVERSY.

Last month we promised our readers the disclosure of a most important and even startling philosophical oversight on the part of Sir Isaac Newton,—one which would of itself break down his celebrated moon-demonstration and show the fallacy of supposing that any sort of mathematical or geometrical relation could exist between the so-called fall of the moon from its tangent and the direct fall of a heavy body on the earth's surface. We will now point out that oversight, and endeavor to show its destructive effect upon the greatest mathematical demonstration of the greatest philosopher known to science.

It is this:—While Newton recognized the earth's attraction of the moon by which it is pulled from its tangent a certain distance in a given time, and also recognized the moon's attraction of the earth by which the latter is also pulled out of its position to a certain extent toward the moon, *he wholly overlooked the fact that the moon also pulls itself a considerable distance toward the earth by its own independent attraction of our planet!* For example, the moon being *one eightieth* (in round numbers) the mass or weight of the earth, it must pull upon the earth, and thus pull itself toward the earth with *one eightieth* as much force as the earth pulls it, and consequently while the earth is pulling the moon 80 miles, for instance, from a fixed tangent the moon is actually pulling itself *one* mile

in the same direction by its own attraction of the earth. Yet this fundamental principle of the laws governing the reciprocal attraction of spheres was totally overlooked by Newton and has never occurred so far as we know, to the mind of any astronomer since.

'Tis true, Newton, all through the *Principia*, speaks of the reciprocal attraction of spheres, meaning thereby that the earth, for example, attracts the moon while in turn the moon attracts the earth, each in the ratio of its mass, but he never intimates the fact, here pointed out, that each also attracts or pulls itself toward the other as well as the other toward itself—and each in the ratio of its mass! Had this fact occurred to the mind of Newton he never could have penned such a prodigious mathematical fallacy as his *so-called* demonstration of the moon's fall from the tangent based on its supposed philosophical relation to the direct fall of a body on the earth's surface. The reason why he could not thus have been misled we will now try to make plain to the reader.

Let us first illustrate the nature of the principle involved. Two men are out upon a piece of calm water each in a boat, the two stationed some distance apart, and each connected to the other by a cord. One boat is 80 times the size of the other, or requires 80 times as much force to move it through the water at a given speed. The men commence to wind up their cords, the one in the large boat, of course, with 80 times as much force as the one in the small boat. The result is, that while the man in the large boat pulls the small boat toward him at a certain rate of speed, he is also pulling his own boat toward the small one at a proportionate rate of speed. In other words while the man in the large boat is pulling the small boat 80 feet through the water, the man in the small boat is actually pulling his own boat *one foot* in addition toward the large boat, thus making the total travel of the small boat 81 feet instead of 80 feet as calculated by Newton in the case of the moon's fall from its tangent. That eminent philosopher entirely left out of his calculation the important factor of *the moon's pull of itself toward the earth*, and only took into account, in estimating the fall from the tangent, the earth's pull of the moon, precisely as he correctly took into account only the earth's pull of a falling stone, since the stone is so almost infinitely small in comparison to the earth that its additional pull of itself toward the earth by its own attraction is too trifling to be taken into the account, and may, for the purposes of this argument, be considered as nothing. Hence, while the falling stone's attraction of the earth adds nothing to its own fall by assisting the earth's gravity, it is plain that the moon does assist the earth's attraction *one-eightieth* in producing its own fall from the tangent!

This important factor of *one-eightieth*, we assert again, was never dreamt of in Newton's philosophy. As proof of this look at his discussion of the cause of the tides. He treats elaborately of the fact that the projection of the ocean is caused by the moon's attraction or pull of the water, but he never thinks of the fact of the ocean's pull of the moon by which it also pulls itself outward toward that luminary, thus causing an important portion of this tidal projection.

As another proof of this same oversight, look at his discussion of the common centre of gravity of the earth and moon. He correctly shows that while the earth is pulling the moon from its tangent, the moon must also pull the earth out of its otherwise normal position, about one-eightieth as much, thus causing the earth to make a small orbit around a common centre of gravity while the moon circles around the earth. This centre of gravity he estimates to be about 3,000 miles from the earth's centre, and all the time about 1,000 miles below the earth's surface on its opposite side from the moon. But in making all this calculation, as in the case of the tides, he uses only the force of the moon's attraction exerted upon the earth, and shows how far this attraction must pull the earth out of its place; but he never thinks to include the earth's attraction of the moon, by which it also pulls itself out of its normal position just as much, and thus carries the common centre of gravity twice as far away from the earth's centre as would result from the action of the moon alone! Hence, as one mathematical result of this oversight we here demonstrate that the common centre of gravity of the moon and earth instead of being located about 3,000 miles from the earth's centre, should be about 6,000 miles from it, or 2,000 miles outside of the earth's surface, at a point always opposite to the moon. This startling difference of one-half in the location of the common centre of gravity of earth and moon results from taking into account for the first time the fact that the earth must actually pull itself out of its place by pulling at the moon just as much as the moon pulls it by its direct attraction. Yet this action of the earth in pulling itself toward the the moon is found in no treatise on this subject so far as we have been able to learn.*

These proofs clearly show that the oversight here charged extends all through Newton's calculations in regard to the reciprocal attraction

* This question of the common centre of gravity is subject to future revision in which we propose other new disclosures, more startling, even, than those here given.

of spheres. It is plain, therefore, that it never occurred to him that the moon, by its own independent attraction of the earth, *pulls itself from the tangent and toward the earth one-eightieth as much as the earth pulls it!* As a consequence it follows that this exclusion from his data of such an important factor as *one-eightieth*, demonstrates his demonstration of the moon's fall by its relation to a stone's fall here, to be only a *chance coincidence*, as we have charged from the first, and a very rough one at that. There is the plainest of reasons why Newton could not have seen or recognized this fact of the moon's pull of itself from the tangent one-eightieth as much as the earth pulls it. Had he ever conceived such an idea he could not have shown such inconsistency as to record his pretended demonstration, for he must have seen that the fall of the pebble, which does not assist the earth's gravity a thousand million millionth in causing such fall, can bear no mathematical or philosophical relation to the fall of the moon from its tangent, since the moon absolutely pulls itself toward the earth by its own reciprocal attraction, *thus adding one-eightieth to the earth's pull!* Or, in other words, if *one-eightieth* of the moon's fall from the tangent is directly due to the moon's own attraction of the earth, while no conceivable part of the stone's fall is due to the stone's gravity or attraction of itself downward, it utterly destroys the relation between the two kinds of fall, as supposed by Newton, breaks down his entire calculation, and shows his greatest demonstration to be a weak and guesswork-contrivance unfit to be incorporated into a philosophical system.

We ask, therefore, is a scientist thus convicted of superficial oversight and error in his most renowned mathematical demonstration, to be trusted in his less important work? In a word, what are we to think of a demonstration based upon pure mathematics, as claimed for this of Newton's, which entirely leaves out of the account *one-eightieth* of the data, or so important a factor as the moon's pull of itself from the tangent, with a force capable of drawing the earth (eighty times as large) 6,000 miles out of its normal position? Such, positively, are the character and magnitude of Newton's oversights, and such is the "pure mathematics" upon which his greatest scientific achievement rests. Yet THE MICROCOSM is condemned unmercifully for daring to call in question any of Newton's so-called demonstrations.

The same oversight here criticized in Newton occurs, of course, in the calculations of Professors Goodenow, Hornung, Kemper, Gray, and a score more of our critics. Every argument they have advanced or can advance on the moon's fall from the tangent, by which to show any necessary relation between it and a stone's fall here, is completely shattered by this disclosure; since it plainly never occurred to either of them that the moon had anything to do with the pulling of itself from the tangent by tugging at the earth, any more than has the falling pebble. Hence the "truer demonstration" of Prof. Goodenow, as published in the August MICROCOSM, with all its twisting and turning *from*, *to*, *around*, *over*, *along* and *across* the tangent, breaks down, since its author likewise never thought of the idea that the moon itself actually does *one-eightieth* of the work of falling from the tangent, while the falling pebble does nothing! What, then, becomes of the "pure mathematics" of the "truer demonstration" with *one-eightieth* of the data ignored?

Prof. Hornung also, in his defense of Newton against THE MICROCOSM, after close calculation, found that the moon's fall lacks just *one-thousandth* of being enough to match his figures. But, to even up this discrepancy, he attributes the *one-thousandth* to the disturbing action of the sun! But here we have *one-eightieth* too much fall, caused by the moon's attraction of itself toward the earth, which neither he nor Newton thought of! Will he try to explain this also by the disturbing action of the sun? Possibly our subscribers at Tiffin, Ohio, can again persuade this celebrated astronomer of Heidelberg College to try his hand at another defense of Newton against THE MICROCOSM! We like such defenses.

The plain, simple truth is, astronomers, like their master, have supposed that the only force that pulled the moon from its tangent was the earth's attraction, and hence they have supposed with Newton that it was entirely legitimate to compare the moon's fall to that of a pebble, since the pebble, of course, cannot add to its own fall by its independent attraction of the earth! Like Newton, also, they have supposed and taken it for granted that the fall of a stone sixteen feet during the first second, was the work of gravity itself, or "the *real measure of gravity on the earth's surface*," as so confidently expressed by Prof. Goodenow, and never suspected to the contrary till THE MICROCOSM pointed it out and demonstrated that not the one ten-thousandth part of that sixteen feet was the work of gravity alone, but that nearly the entire fall was due to accumulated velocity. We trust these disclosures will cause astronomers and mathematicians to open their eyes wider than they have ever opened them before, and not, like the unfortunate Professors named, fatally commit themselves by rushing precipitately to the defense of Newton before they really understand what Newton teaches.

Finally, in the light of the disclosures here made, we can easily imagine the moon revolving in its present orbit, and falling from its tangent by its own individual attraction of the earth, *and with the earth's attraction of the moon entirely cut off!* To the mind of Newton, such an idea would, of course, have been an impossible conception. But we have only to suppose the moon's projectile or tangential force reduced to *one-eightieth* of its present velocity and effect, and it is perfectly plain, if the earth should not attract the moon at all, but merely serve as a base for the moon's attraction the same as it does now, that the moon would proceed steadily in its orbital path at *one-eightieth* of its present velocity, drawn continually from its ever-varying tangent by its own attraction of the earth, and consequently would complete a circuit in almost exactly six years, instead of a little more than twenty-seven days. On this supposition, it is plain that the moon would, all the time, continue to fall from its tangent, the same as it does now, only slower. But tell us, ye profound followers and defenders of Sir Isaac Newton, what relation such fall of the moon would have to the present fall of a stone on the earth's surface! The only answer can be—*none at all!* Then, manifestly, Newton's demonstration breaks down, since the moon's present fall from the tangent *positively includes the very fall we have just described, and which was totally overlooked in Newton's calculations!* Had he obtained even the faintest glimpse of such possible rotation of the moon in its present orbit, without the aid of the earth's attraction, and by means alone of its own independent pull upon the earth, and a corresponding reduction of tangential force, he never would have perpetrated the glaring fallacy of his so-called moon demonstration, since he would then have seen the want of any necessary relation between the fall of the moon and that of a stone at the earth's surface.

The reason why this beautiful and self-manifest revelation from the spheres was not made known to Newton's mind, was owing entirely to the fact that he had a pet theory of his own to carry out, and a mathematical demonstration to establish, to which the facts and phenomena of Nature must be made to conform, without, as we freely admit, any dishonest intention on his part. But so anxious was he to verify his preconceived hypothesis, upon which the great law of gravity hinged, and which he found would not fit the supposed distance of the moon and magnitude of the earth at that time, that he waited patiently twenty years after he had invented his "favorite hypothesis," as one of his biographers calls it, till other parties had figured the earth's magnitude to the suitable size, and the moon's orbit a sufficient distance away from the earth to fit his theory! When these were done, he made haste to place this coincidence, which he called a "demonstration," on record, and so hurriedly did he do it, that he entirely forgot to include *one-eightieth* of the moon's actual fall, *since this one-eightieth did not attach to the direct fall of a stone here!* Had he thought of this *one-eightieth* which he left out, he would again have laid his "favorite hypothesis" on the shelf, not for twenty years longer, but for all time. We now, by permission of modern astronomers, supply this lack and lay it permanently on our Microcosmic shelf, without any charge for storage.

In the light of this disclosure and many other facts of similar import, brought to the surface in THE MICROCOSM, it becomes plain that the true laws of gravitation, and the real part it plays in the harmony of the spheres, have not yet been formulated, but that the whole question, like that of sound, now lies practically in a state of chaos. As Prof. Thomas Munnell truthfully said in the August Number, "The work of destruction thus completed, the work of reconstruction must now commence." To this work we cordially invite the attention of competent and candid mathematicians.

THE REFORMRD MESSENGER. ANOTHER "K"

(*All about Sound in a Vacuum, etc., etc.*)

We are gratified to note that the *Problem of Human Life* has received another free advertisement, this time in *The Reformed Messenger* of Philadelphia; and what is curious about it, the notice is from the pen of another "K." This singular K might stand for Artemus Wards' *Kangaroo*, judging by the "amoosing" character of its tricks; but we learn by letters from several Reformed clergymen who read *The Messenger* that K actually stands for one of the assistant editors of that paper. His attack upon the "Problem," however, is so weak and so evidently inspired by a spirit of envy at the success of that book and the stir it is creating in the religious and scientific world, that his friends advise us to draw upon our attribute of pity and pay no attention to the harmless diatribe. We should cheerfully take this advice but for an attempted argument, injected into one part of his article, against our position on sound and in favor of the wave-theory, which needs answering; and cruel as the reply must be, even using the mildest terms, it becomes necessary that mercy in his case be tempered with justice.

The writer asserts that we "dodged" the principal argument of Prof. Brockett in favor

of the wave-theory, namely, that a music-box placed in a receiver with the air completely exhausted, will not be heard by persons in the room, because there are no air-waves to convey the sound from the instrument in the vacuum to the sides of the receiver. He heads his article, in view of this stunning difficulty, "*Let Wilford Answer.*" Well, here is Wilford's answer.

In the first place there was no dodging about it, since there was no occasion for a reply. We had fully answered that objection to our views on sound in another part of the "Problem," and considered its presentation by Prof. Brockett as trivial, or as showing a total want of attention to our published arguments. If sound is an incorporeal substance, analagous to electricity, as we had elaborately urged and claim to have abundantly proved, it would not seem to require a very high order of intelligence to suggest the fact that these substantial sound-pulses, like substantial discharges of electricity, would in all probability require a conducting medium of some kind in order to travel. The fact, therefore, that substantial sound-pulses do not travel in a vacuum, or without some sort of conducting medium, presents no argument whatever in favor of the wave-theory to a man whose head is not also an exhausted receiver intellectually pumped dry. But "K" might be excused from comprehending it, since the perfection of his cranial vacuum, as will soon be seen, ought to do away with any necessity for a Torricellian tube in the laboratory of *The Messenger* office.

For the benefit, however, of the general reader, let us now settle this vacuum argument as well as this critic, so they will remain settled for the future. First, look at K's profound statement of the difficulty. He says:

"A music box in such position [in a vacuum] *cannot be heard, because there is no air to be put in motion by the vibration of the elastic body.*"

Now let us inform this objector that a cask filled with *water* is a much better *vacuum*, so far as *air* is concerned, than if it were a receiver exhausted by the best air-pump ever constructed! Yet two pebbles struck together at the centre of this cask of water can be distinctly heard outside and for several yards away. But here comes "K" repeating the words of Prof. Brockett and declaring that the sound of the pebbles "*cannot be heard because there is no air* [in the cask] *to be put in motion by the vibration of the elastic body*"! We might thus bid good-by to the wave-theory, and also to K, as an acoustical critic.

But we write for the benefit of the reader, and ask, what is the true solution of the problem in hand? Plainly it is this. The water in the cask is the conducting medium, instead of air, and conveys the sound of the pebbles struck together the same as would a cask of air, only much better, since water is a four-fold better conductor of sound than is our atmosphere as Prof. Tyndall distinctly teaches, just as copper will conduct electricity with much greater facility than will iron. But iron, on the contrary, is the best conductor of sound, though an iron rod is a much better *vacuum*, so far as relates to *air*, than any receiver can be made by exhausting with an air pump. Although no air, comparatively, is contained in such iron rod, yet Prof. Tyndall tells us that it conducts sound with "*seventeen* times its velocity in air." Why? Because, simply, it is a *seventeen*-fold better conductor of sound than air, just as copper is a three-fold better conductor of electricity than iron! But this new scientific light of *The Messenger* steps forward and tells us that sound will not travel in iron at all, "*because there is no air to be put in motion by the vibration of the elastic body*"!

Truth is, this *Reformed Messenger* needs reforming at least in its editorial corps (we at first wrote it *corpse* by mistake) unless it wishes to come into *bad odor* with its more intelligent class of readers.

In a word upon this phase of the question, it is plain that sound, like electricity, another and analogous incorporeal substance, will not travel without a conducting medium of some kind; but like electricity, each governed by its own law of conduction, it travels through various substances with varying degrees of facility. Like electricity also, sound travels through the various media without the slightest disturbance or motion of such conducting substance, whether it be air, water or iron, any motion of such conductor being incident to the production of sound, and no part of the sound itself. Had "K" read Chapter VI, of the "Problem," and been capable of understanding it, he would have seen the absurdity of supposing that sound travels through a mass of water, rock, or iron by throwing those substances into undulations consisting of "condensations and rarefactions," as is supposed to be the case in air! But he admits that he had not read the part of the "Problem" treating on sound which he was criticising. Here is his unenviable confession:

"*This part of the Problem of Human Life we have not read*, except the correspondence in reference to it, and which is appended to the main argument!"

Thus, we have the N. Y. *Independent* editor right over again and boiled down! Positively we could not have believed, had we been told it, that two such editorial blockheads could be found in America, who would enter into a serious criticism of a book prominently before the

public, condemning it in unmeasured terms, and before getting through with their criticisms make the voluntary confession that they *had not read it!* As an offset to this blind-fold criticism in *The Messenger* we take pleasure in referring the reader to the article copied elsewhere from the *Reformed Quarterly Review* written by another clergyman of that order who, as we learn, read every word of the book, some of it three or four times over, before commencing his review.

One other point deserves to be noticed before closing these strictures. Our critic comments unfavorably upon the fact that our reply to Prof. Brockett, as published in the "Problem," occupies ten pages, while his arguments occupy but a page and a quarter. "K" does not seem to be aware of the fact that any one can condense a long series of objections to a new departure in science and write down a string of unproved assertions about the old theory which, if entirely without foundation, would require ten times as much space successfully to analyze and set them aside. The "fool" could say "in his heart," and write it out on paper in four words—"There is no God." But it would take a wise man many days and require him to fill many duodecimo pages in order successfully to reply to such a stupid assertion and demonstrate its fallacy. Our brilliant critic, however, observing the disparity in the length of two such articles and acting upon the principles of logic which seem to characterize the editorial department of *The Messenger* (by not reading what it pretends to criticise,) would at once decide against the wise man because the fool had made the shortest argument!

We could give a dozen or more letters from Reformed clergymen in different parts of the country strongly disapproving of *The Messenger's* course; but we will copy only one as a specimen of many:

"A. Wilford Hall, Ph. D.:

Dear Sir: I have read your *Problem of Human Life* as well as *The Microcosm* with much interest; and I must say that I have not only been benefitted, but have gained such forcible arguments for a positive Christianity and the faith of the Bible that I would not part with your book under any consideration if I could not replace it. If your "Problem" were more carefully read and studied by clergymen we would not have the kind of criticism that appears in *The Messenger* by one of our ministers. I send you a copy of that paper by this mail that you may see the kind of argument that is used against your book. May God bless you in your noble work. D. H. Reiter,

Pastor 1st Reformed Church,
Fulton, Mich.

☞Let all who want a copy of the revised *Universalism Against Itself* about Christmas send on their names, that we may know about how large an edition to print.

"THE AMENDE HONORABLE."

(*The Christian Standard Once More.*)

The above is the heading of an article in the *Christian Standard* of September 16th, with reference to the libellous charges published a month before against the Editor of The Microcosm, as contained in a letter written to the *Standard* by C. Shelburne, of East Tennessee, and which we copied last month. We are gratified to state that the *Standard*, of the above-named date, contains a complete retraction of the libel, both from the pen of Mr. Shelburne and from the Editor himself, acknowledging that it was a case of mistaken identity, and that the "Hall" of East Tennessee who preached spiritualism and "special influence" twenty years ago, was not the Wilford Hall of Microcosmic fame! Among other things Mr. Shelburne says in his letter, as now published in the *Standard*, but directed to A. Wilford Hall:

"I wrote the letter of July 24th, in which I have mistaken your history, and for which I am sorry. It was not done in a malicious spirit or with the intention to injure you, *nor was it my intention to have it published*. . . . . Had I intended the letter to be published, I would have given my address. It seems that I, with many others, have been mistaken as to your history. . . . . The fathers of East Tennessee have supposed you to be the same Hall they knew fifteen or twenty years ago. As to your history, I have been mistaken, for which I am sorry and hope you will forgive."

In reply to this letter, the Editor of the *Standard* says, among other things:

"We printed Brother Shelburne's card [the one containing the charges] in good faith, supposing it must be susceptible of absolute proof, or such positive language would not have been employed. We can, of course, do no less than apologize for its appearance. And we do this with pleasure."

We accept this apology, of course, as far as it goes, as well as that from the pen of Mr. Shelburne, and regret that we were provoked by the slanderous charges to reply as sharply as we did. But we must say there is one factor in the *Standard's* course that this apology does not quite seem to explain. It is seriously asked by many Christian ministers who read the *Standard* and who have written us upon the subject, why the Editor of a Christian journal should find it necessary to change a scientific controversy with another editor into a personal attack, and publish without permission, unauthenticated charges against his character? They ask: Even supposing the charges in Shelburne's letter to have been "susceptible of absolute proof," why should a Christian editor seize upon them with such avidity, even when not intended for publication, and spread them out before nearly one hundred thousand readers, if he had not felt that he needed something besides argument to help him in his controversy? Even supposing that we had been the genuine Tennessee "Hall" who, twenty years ago, taught Spiritualism, preached "special influence," kicked up a muss generally, with the "fathers" and was dressed down by Alexander Campbell, what had that to do with Newton's demonstration of the moon's fall from the tangent? Besides, even supposing the two propositions to be essentially related, and that we were the troublesome "Hall" complained of, might we not have repented of our

evil ways during a "purgation" of fifteen or twenty years, and now be all right; especially in view of the fact that we had since written the *Problem of Human Life?* The Editor of the *Standard* knew of this book and was well acquainted with its author, and from his own expressed appreciation of the work, as given in his paper, he ought to have considered it "works meet for repentance," even if we had been a little shaky twenty years before, on "special influence;" and even if it had been "susceptible of absolute proof!" Look at what he thought of us and of our book before our gravitation controversy commenced:

"The scientists who have dealt so flippantly with the solemn questions of spiritual and Divine existence, and talked so vauntingly of their scientific demonstrations, will find that they have caught a Tartar. *We cordially commend this work to our readers for earnest study.*"

That ought to have satisfied the Editor, even if there were no mistake in Shelburne's letter, that our "purgation" had been sufficiently punitory to condone a mere error of opinion which we might have entertained twenty years ago. What, then, was the motive for thus assailing our character? It was not chagrin or mortification over defeat in the gravitation controversy, for he says in this very retraction, that he did not print the letter of Brother Shelburne from a feeling of "spite over defeat. The only defeat in our controversy with THE MICROCOSM, has been suffered by that journal"! Then the attack upon our character must have been without incentive, save a desire to injure a man who is working night and day to defend Christianity against the attacks of infidel scientists. As victory had already perched triumphantly upon his own banner, he could have afforded, one would think, to be generous over a fallen antagonist! One would naturally suppose that a chivalrous scientific gladiator who had achieved a stunning victory over such a paper as THE MICROCOSM, would have gone away smiling rather than turning to throw the first mud he could find upon the mangled form of his prostrate foe!

But let it pass. THE MICROCOSM is satisfied, so far as it is individually concerned, and is ready to shake hands across the *muddy* chasm. But the apology is only one quarter broad enough to cover the offense. Whenever the Editor of the *Standard* shall humbly apologize, first to his subscribers, then to the Christian Church, and finally to the press of the country for lowering the standard of journalism by assailing the character of a brother editor with no conceivable motive save that of malice, will he be forgiven by the public—but not before.

REPRINT OF VOL. 1.

The proposed reprint of volume 1 of *The Microcosm* is well received and we have already about half enough names for copies to justify issuing the work. We think there will be no doubt as to our reproduction of that volume in book-form, and in uniform size with the present volume, bound in cloth, at $1 per copy, as soon as *Universalism Against Itself* is off the press. That volume of *The Microcosm* will also, by general request, contain the steel-plate portrait of the Editor, as proposed elsewhere for *Universalism vs. Itself.* Let the names for the reprint come forward if it is wanted.

UNIVERSALISM AGAINST ITSELF.

The announcement of the revision and re-publication of this book has been received with an enthusiasm entirely unexpected. The names already received subscribing for copies as soon as published, are a guarantee that justifies at once proceeding with the work of revising and electrotyping, which are now steadily progressing. We expect to have the work bound and ready to mail by January next, or before. We have received about one hundred applications for agencies to sell the book by canvassing for it. Other applications are desired.

By special request of old agents who sold the former issue of that book, more than thirty years ago, we have decided to insert a fine *steel plate* likeness of the author as a frontispiece. We promise a *picture* this time, and not such a semi-failure as the one in the August number of this paper. Let all who desire copies send on their names. Notice will be given in THE MICROCOSM when to remit the dollar. A heavy discount will be made to agents, thus placing the work almost at cost.

We will add with reference to this proposed re-publication, that several Universalist clergymen who take THE MICROCOSM have written us, very kindly urging us not to publish the work, lest it should gender strife among Christian workers and interfere with our own labors in demolishing scientific materialism. But on the other hand, a number of Universalist ministers have likewise written us, in a most friendly spirit on the matter, proposing to take a copy of the book as soon as ready. As a specimen of these friendly communications, we give below a letter from the Rev. Dr. George Severance, which expresses the feelings of many of his liberal-minded brethren in the ministry, toward the work we are doing. While we honestly believe, as we did forty years ago, when that book was written, that not a single verse of Scripture properly understood, favors Universalism, we nevertheless can heartily take by the hand any sincere believer in that doctrine, as a co-worker in trying to elevate and better the condition of man in this life, without reference to the contingencies or non-contingencies of the life to come. But the following is the letter of Brother Severance, which speaks for itself:

TUNBRIDGE, Vt., Sept. 11, 1882.

WILFORD HALL, ESQ.,

Dear Sir:—I have long had it in mind to express to you my appreciation of your literary and scientific labors as made known to the world through your *Problem of Human Life*, and *Microcosm.* You have received so many deserved encomiums that you cannnot avoid feeling gratified, not to say flattered. If you can preserve your equilibrium under such strain you will do well and better than most men would in such position. Be this as it may, I must also congratulate you and the world upon the results of your labors. I have read and re-read your "*Problem*" with the most exquisite pleasure and satisfaction. If any man within the last hundred years deserves to be credited with originality you are emphatically that man. Any school-boy can see that you have put the scientists of the Darwinian school *hors de combat.* You have spoiled their reasoning as completely as you would spoil a syllogism by annihilating one of its members; and I must say it is singular that not one of those eminent scientists shows a willingness to take

up the gauntlet which you have so defiantly thrown into their very teeth. It can only be because they feel that their position is not tenable, and from a disinclination to expose its weakness still further by defeat. Strange, also, as are many of the mysterious phenomena of existence, stranger still is the fact that the time-honored and accredited theory of sound should now be demolished. Yet it is simple fool-hardiness on the part of acousticians to attempt any longer to defend it after reading your book.

I am a Universalist clergyman, sincere in my belief, but I am with you heart and soul in your present work; and should you republish *Universalism Against Itself*, I shall purchase a copy. I am so much interested in your labors I can give you a good fraternal shake of the hand. Believe me to be very truly and cordially yours,

GEORGE SEVERANCE.

SOUND-WAVES.

Mr. G. C. Blish, of Du Buque Iowa, writes us, presenting as he thinks, a serious objection to our views on tympanic vibration, and says, if we do not answer in *The Microcosm* he will be forced to consider us on a par with Tyndall, Mayer, & Co., namely, that our silence results from our inability to reply, &c. This is not a fair conclusion, but we will answer his objection:

He says:—"In your July No., in the article on *Tympanic Vibration* you say that this membrane cannot vibrate to sounds of low pitch for want of size. Have we not a visible illustration to the contrary in the transmitter of a telephone? It will vibrate to all the waves of a band playing at once."

Now we see just what is the matter with Mr. Blish. He gets hold of a part of an argument by reading one number of *The Microcosm* and proceeds to raise what he thinks to be a formidable objection, but to which we have previously replied over and over again in our treatise on sound. If Mr. Blish will read the *Problem of Human Life*, page 334, he will find his objection carefully analyzed and answered. He will there see that the highest scientific authorities in Europe, including the great French investigator, Count Du Moncel, have decided after long and careful experiment that the membrane of the telephone *does not vibrate at all in the transmission of sound.* It *can* of course be made to vibrate by speaking in close contact with the instrument, but this is only the incidental effect of the air-waves which incidentally accompany the sounds, but which are no part of the sound itself. As proof that no vibration of the transmitter is necessary in conveying telephonic sounds Dr. R. M. Ferguson, Ph. D., the great Scotch physicist, has demonstrated that a solid disk of iron an inch thick will transmit communications the same as will the common diaphragm of a Bell telephone! The fact is, the sound is transmitted by the contact of the substantial pulses with the substantial electric fluid coursing through the wire. The affinity of the two substances for each other causes the sound impulses to be impressed upon and conveyed by the electric fluid and re-converted into audible sounds at the receiving instrument. How such wonderful affinity can exist between two incorporeal substances is not now comprehended by mortals. But it is no more a mystery than a thousand other things of daily observation; as for example how a spoken word mingles with a maiden's thoughts, stirs her blood, and causes a crimson blush to cover her face!

We ask objectors on this sound-discussion first to read the two chapters on that subject in the "Problem" and we predict that ninety-nine times in a hundred they will find their difficulties met in advance. This advice applies particularly to Prof. Joseph S. Large, of Traverse City, Mich., who is writing to Mr. Goodrich, anxious to get the $5,000 cash prize by suggesting various inconsiderate means for producing silence by making a noise, which, if he had first read the "Problem," he would have been ashamed to put on paper. Mr. Goodrich says his offer still holds good, and that the nearest any one has come to winning the prize is Dr. Booth, of Shreveport, La., as explained in his letter printed in the August number of *The Microcosm.*

THAT "BEAUTIFUL BOOK."

Mr. A. Wilford Hall:—Seeing your notice in "The Microcosm" of "*Walks and Words of Jesus*," by Rev. M. N. Olmsted, I feel constrained to say, that could you but make its great value known, your sales would be *very large*, for then few would like to be without it.

I have used this work, as S. S. Superintendent and otherwise, so profitably, for a number of years, both to obtain and impart that knowledge "which is unto life eternal," that I feel sure one half has never been told of its inestimable value as a Harmony of the Gospels; and like the lepers in the Syrian Camp, at the gate of Samaria, I feel that I "should not do well to keep this to myself."

I marvel that this new arrangement, which re-voices the *very words* of Him who "spake as never man spake" was not sooner discovered and that it is not now universally sought after, and I am confident that all who use the Gospels in this form will have greatly the advantage of others, both in pleasure and profit.

Wishing you great success in your enterprise by the due appreciation of a Christian public.

I am yours, &c.

WM. M. HUDSON.

Mount Vernon, N. Y.

TO MATHEMATICIANS AND ASTRONOMERS.

We send a copy of this number of *The Microcosm* to a few of the leading mathematicians and astronomers of our colleges and universities, and ask them in all candor and kindness to read the two articles involving Newton's moon-demonstration, one headed *The Gravitation Controversy*, and the other, *Profs. Kemper and Gray on the Moon*. If they still think Newton's demonstration correct we would be glad to have their reasons for so thinking, briefly and concisely stated. If they shall, on the contrary, decide that Newton was mistaken, we will be equally glad to have them say so.

THE GREAT "TRIAL."

Last month we closed our extract from the remarkable book called "The Trial," and suggested that any who might want a copy could have it for $2. At that time we had not learned the price of the book. Since then we have received a letter from the publisher at Birmingham, England, informing us that copies will be mailed direct to the United States for $1,25. Those who may wish a copy, and will send us the price, will receive it through our agency direct from England.

AN IMPORTANT RXPERIMENT.

Next month we will give the programme for an important scientific experiment now in contemplation for verifying or overturning the present theory of acoustics. It will consist of a number of extemporized magazine explosions conducted under the direction of proper committees, to determine the truth or incorrectness of the prediction recorded in the *Problem of Human Life* that the *sound* and the *condensed wave* of such an explosion are entirely distinct phenomena, and that they will be found to travel at different rates of velocity. Full details of the contemplated experiments will be given next month, and in the mean time we desire to hear from colleges and other scientific institutions that might wish to take part in those experiments or make suggestions with reference thereto. Let professors and students of science who wish to comprehend the bearing and necessity of the experiments referred to, read the *Problem of Human Life*, beginning at page 103, or the October number of *The Microcosm*, Vol. 1.

THE AMERICAN CHRISTIAN REVIEW.

In pleasant contrast with the *Christain Standard's* course toward *The Microcosm*, we are gratified to note week after week the kind reference to our labors in the *Christian Review*, so ably conducted by its Editor, Eld. John F. Rowe, and its co-Editor and proprietor, Eld. G. W. Rice. As these two papers are patronized and supported by the same religious denomination, we see no reason why those who are satisfied with the *Standard* should not be more than doubly satisfied with the *Review* as a family journal, filled as it is weekly with the choicest intellectual food. We most cordially commend it to every reader of *The Microoosm* belonging to that Church, and we have thousands of them on our subscription books.

REV. J. I. SWANDER, A. M.

We are proud to add to our list of contributors the name heading this item, whose excellent review of the *Problem of Human Life* is copied elsewhere from the *Reformed Quarterly Review*. Next month his first contribution direct to *The Microcosm* will appear. It will be a telling disquisition upon the "Ultimate Test of Scientific Truth."

THAT LONG-PROMISED EXPLANATION.

For a wonder, after waiting three months, the *Christian Standard* of Sept. 23, comes out with its long-promised explanation of the moon's fall from the tangent, in defense of Newton's great mathematical demonstration of the law of gravity. The Editor prepares the way for his explanation by copying from *The Microcosm* for August last the entire article of Prof. Goodenow, with his diagram. He then proceeds with two columns of his own solution to make clear what Prof. Goodenow had failed to explain.

As the *Standard* reaches us too late for our reply this month, we reserve it till the next issue, when the reader may look out for scientific fun. In the mean time we make the friendly proposition to the *Standard* that we will copy its entire explanation verbatim, diagram and all, in the November *Microcosm*, if the *Standard* will agree to copy our reply as soon after receiving a copy as convenient,—say within two weeks. The Editor of the *Standard* is of course at liberty to make any reply to our criticisms he can, or may feel disposed to. If this very fair proposition is not accepted we will give our reply in the next *Microcosm* with the salient points only of the *Standard* article. A note from the Editor is requested indicating the acceptance of our offer as here made, a copy of which will be sent him in advance of this issue.

ANOTHER NEW CONTRIBUTOR.

As we go to press we have received an exhaustive argument against the supposed development of man's intellectual faculties from the minds of lower animals, written by the Rev. Dr. Joseph S. Van Dyke, the eminent scholar, author, and Presbyterian divine. The first installment of this masterly argument will be given next month and be concluded in the December number. Accompanying this argument we also received an off-hand criticism of the *Problem of Human Life* from the same pen which we will print in next issue as a specimen letter. We will only add that we are now reading one of Dr. Van. Dyke's very interesting books entitled "*Through the Prison to the Throne*," which we will notice in due time. So far as we have been able to read, in our crush of engagements, we are very deeply impressed with the importance of the work.

OUR MICROCOSMIC DEBRIS

Is again crowded over on account of the length of our editorial discussions and reviews, which we could not well leave out. Next month we will give the usual installment of interesting miscellaneous items on all sorts of subjects and from all parts of the world.

WILFORD'S MICROCOSM.

Vol. II.—No. 4. NEW YORK, NOVEMBER, 1882. { One Dollar a Year. Single Copy 10 cts.

THE ULTIMATE TEST OF SCIENTIFIC TRUTH.

BY REV. J. I. SWANDER, A.M.

The fundamental mistake of modern scientism springs from its disposition to perform the part of the judge, instead of occupying the place of a disciple. Its protagonist is Pontius Pilate. Truth is arraigned before the bar of an incompetent court, tried upon a false issue, and convicted upon inadmissable testimony, for the primary purpose of condemning and crucifying the high standard of Eternal verity by which systems of error are detected, and deeds of darkness made manifest.

What is truth? Pilate's question *seems* proper, especially when accompanied with the washing of his hands in token of affected innocence; but it did not proceed from an honest desire to possess that after which he pretended to reach. The Roman governor has passed away, and his name has perished in the infamy of his arrogance; but the same line of false investigation runs parallel with the history of the world. Double-dealing and cowardice appear in every chapter. Men seem to inquire after the truth; yet, when overwhelmed by the presence and power of its majesty, they shrink away into the retreats of significant silence. The only part assigned them in the last act of the comedy is to play the pitiable poltroon. They do not even wash their hands in mockery of innocence. For this neglect, however, they are excused, as their exploded fallacies do not hold the amount of water necessary for such an ablution.

But what *is* truth? The question is eminently in order at this time, and in this age, so remarkable for the boldness of its philosophical inquiries, and the brilliancy of its startling achievements. The better class of daring adventurers, who are now pioneering their way into the unexplored provinces of Nature, are conservative progressives. They cherish admiration for the good and the great of the past, but are not willing to confine themselves in the coffins of a truth-loving ancestry; neither are they ready to pin the broader folds of their faith to the narrow shrouds of creeds and theories whose principal merits consist in plausible features and popular following. Such progress is not radicalism. Such courage is not recklessness. Such zeal is commendable. Let cowardly conservatives to the rear. Let prudent progressives move forward. They *are* moving forward. Their numbers are increasing. Their faces are aglow with scientific hope, as the heroic vanguard rolls back the shouts of truth's new victories along the advancing lines.

But how are we to know whether certain recent announcements of scientific solutions are founded and fortified in the truth? Take "Wilfordism," for example. What sign showest *thou*, that we may believe? Unanswerable logic is good, but we want something better. What is the ultimate test of truth? Where is the pattern to which the system of true philosophy shows a resemblance in every fiber and figure of its warp and woof? It is found in the Christian religion—the inspiration of the world's best thought, the nursery of its finest arts, the mother of its soundest philosophy, and the queen of all the sciences not "falsely so-called."

As man was made in the image of God, so does all perfect human science reflect the image of the divine—the Christian religion. This perfection is attainable, not by outward irritation, but inward coalescence, by the breathing of the life-breath of Christianity into the very nostrils of scientific theories. Thus the "wisdom of God in a mystery" becomes the wisdom of man in history; and thus "the tabernacle of God is made to dwell with men." "*And look that thou make them after the pattern which was shown thee in the mount,*" (Ex. xxv:40.) In obedience to the general principle underlying this injunction the Hebrew law-giver proceeded to build the Tabernacle. The builder was on earth, the Architect in heaven. Fidelity to this fundamental rule made the son of Pharaoh's daughter illustrious for all ages. Materialism alone disputes the application of this universal law, and Atheism becomes a monument of absurdity by striving to stretch the tender threads of its sophistry from the "Eternity of matter" to "the mistakes of Moses."

Here, then, in Christianity, we have the true pattern and divine attestation of all correct theories in science, and sound systems of philosophy. But what *is* Christianity, under this view? What is this model from the Divine Architect? What are the essential principles, the peculiar characteristics, and the approximate outline of the Archetype, whose origin is "Eternal in the heavens," and "whose builder and maker is God?"

Christianity is (1) a *new creation*, as real and distinct as that which in the beginning included the heavens and the earth. (2) It has an objective and *entitative existence*, holding in the organic union of the substance of the Son of God with the essential substance of humanity, in the sense that "the word (Logos) was made (assumed) flesh." (3) This new creation *heads in Christ*, "the last Adam," "the Lord from heaven," the "quickening Spirit," even as the old creation culminated in the first Adam, "a living soul," (1 Cor. 15.) It is a kingdom in organic unity, as well as a unity in expansive and progressive evolution. Christ the true Witness, the Beginning of the (new) creation of God, (Rev. iii: 14,) is the primordial parent, (Is. ix:6) of the peculiar progeny born of the very substance of Him "of whom the whole family in heaven and earth is named," (Eph. iii:15.) (4) This kingdom of God is *at hand*, replete with supernatural and substantial forces, for the solution of the most intricate and complicate problems of the universe, and for the salvation of all assimilable subjects in the sub-kingdoms of humanity. (5) Having an objective existence, in an organic entity, it is not dependent upon subjective repentance, faith or experience, however essential these conditions and organs of receptivity on the part of the individual who becomes a citizen of the royal realm, and a consequent recipient of its saving virtue. (6) In a word, Christianity is *life*—not a mere attenuated, human life, but a distinct effluence of the life of God, which was not in the world in the same sense, and to the same extent, before the Incarnation. "In Him was life, and the life became the light of men." This life is

not merely a divine "mode of motion," but the very substance of things hoped for by the deepest yearnings of the substantial human soul.

From the foregoing it follows that the Christian religion does not consist in mere *supralapsarian fiat* on the part of God, nor in supersensible *feeling* on the part of man. It does not hold its being in mere abstract truth, under the form of doctrinal tenets; neither does it move forward in the chariot of human logic, as though man's greatest want were the liberation of his intellect from the thraldom of error. Though intimately related, the Bible is not the same as Christianity. The Bible is an outward manifestation of an inward life—substantial mystery in sacred history—principle in precept—law in statutorial form—truth in effluence—the unimpeachable testimony which Christianity gives of its origin, purposes, operations and conditions, as it moves on through the ages, bearing witness to the truth. The Bible can testify to the truth only as Christ the absolute fountain of eternal verity, comes "in the volume of the book," to animate its paragraphs, and illuminate its pages. Truth, under this concrete view, is inseparable from life. Under any opposite view it is truth in mere abstraction. Truth in abstraction (in the biological domain of science) is practically the truth held in unrighteousness—a perversion—a *lie*—anti-Christ—a virtual denial of the Incarnation in its proper historical sense, and a cowardly surrender of the only key by which intelligent faith may hope to solve the world's most momentous problem, *the destiny of man*.

It follows further that Christianity, as to its inner organic entity, is not moulded from without, or made dependent upon its form, as Materialism teaches concerning the dependence of the soul upon the body, and as some acousticians still teach, affirming the dependence of "sound" upon the medium of its conduction. Like all other orders of life, in bending its energies towards externalization, Christianity is free to *take* and *change* its own form in the organic outflow of its mission, until it completes its terrestrial history in that final fullness and form which shall respond to the pattern within; and while thus free, it is also bound to take *only* such form as its inner model constitutionally involves. That final form will be the triumphant church, the body of Christ, the fullness (complement) of Him that filleth all in all. (Eph. i:23.)

Christ must therefore be held as the Prince of all true philosophers, and His religion as the prototype of all sound philosophy. To this end was He born, and for this cause came He into the world to bear witness to the truth; and *every one* that is of the truth heareth His voice. (John xviii: 37.) Christ does not bear witness to the truth by merely affirming the correctness of an abstract statement, or scientific theory; neither does He demonstrate truth by mere argument—He propagates it by the invincible logic of that life which animates the new creation, and the effulgence of the light which shineth even in the darkness which comprehendeth it not. Christ is *the* TRUTH. He authenticates Himself; and only that which He authenticates is true. All else is dangerous fraud, and damnable falsehood.

It is strongly suspected, in certain quarters, that the author of *The Problem of Human Life*, in projecting his new system of philosophy, had his best eye fixed upon the "pattern in the mount," while he watched with his other eye those materialistic Evolutionists who have labored so hard to prove that Moses was a fool for building after the directions of the Divine Architect. How can we otherwise account for the startling appearance of a philosophical system, between which and the "mistress of sciences" the points of analogy are so fundamental, and so full of force? Very well. What if he did imitate the best model. Such imitation involves no theft of copyright. There is no other true model after which to build. Other foundation can no man lay than that which is laid, JESUS CHRIST. That system of religion, philosophy or ethics—goodness, truth and beauty—which is not built upon this foundation, as well as after this pattern, is a superstructure of "wood, hay and stubble," whose only element of worth is excellent combustibility. That system which not only recognizes the kingdom of Christ in its organic and entitative sense, but which is also moulded after it, by the plastic power drawn from it, is wrought of the "gold, silver, and precious stones" that will enable it to stand the test of the fiery day. This is the judgment bar of all scientific claims, especially those of biological pretensions. Let Gabriel's trumpet sound with a full charge of corpuscular emissions; let the ultimate test of truth ascend the throne; let modern materialism come forward upon the rickety vehicle of its "molecular motion" and receive the sentence it so richly deserves.

THE GREAT CONFLICT.

BY REV. T. WILLISTON.

Ever since the fall and expulsion from Eden of the first human pair, a conflict, so to speak, has been going on between darkness and light, ignorance and knowledge, that which is false and that which is true. In this conflict light has been gradually gaining on the darkness, knowledge on ignorance, and the truth on error; yet even now ignorance and error hold the mass of men under their sway. The word error, derived as it is from a Latin verb signifying *to wander*, literally means *missing one's road*, or getting out of the right path; and hence it figuratively signifies any *deviation from that which is true*, whether in earthly or spiritual concerns, whether in science or religion. Some of these wanderings from the truth are ascribable to man's limited capacities and powers of investigation, or his limited facilities for arriving at the truth; while errors in religion have their chief origin in his moral obliquity and estrangement from God. All errors are more or less hurtful, yet errors in science and the concerns of this life are far less injurious than mistakes in the concerns of eternity.

These mistakes endanger the soul, yea, ruin it sometimes; whereas the former class of errors, though attended with loss, block up no one's way to heaven. They are comparatively harmless; yet as they are not *wholly* so, we rejoice that even these errors are being gradually eliminated by the light of science and the world's progress in knowledge. Had men always been acquainted with hydro-dynamics, or always known that water, however tortuously conducted, will unfailingly find its level, they would have been spared the toil and expense of bridging a valley with huge aqueducts in order to convey water from one hillside to the opposite one. Had men always known what they now know, the Alchemists would not for centuries have wasted a vast amount of time and labor in efforts to discover a method of trans-

muting the baser metals into gold, and to find a universal remedy for disease: nor would so many fruitless efforts have since been expended in trying to invent a machine that would go without ever stopping. Surveyed in the light that science has long been diffusing, how irrational, absurd, and even ridiculous do many things appear that were once believed and done. At this late day it seems marvelous, for instance, that Claudius Ptolemy could so egregiously blunder as to teach that the sun and stars revolved around the earth every twenty-four hours! How deceptive and preposterous has science made divination in its various forms to appear—disclosing hidden things or future events by examining the stars, the air, the flight of birds, cracks in the earth, the bowels of slain animals, the palms of the hand, "looking at the liver," holding converse with the dead, and the like! In its conflict with error, true science, aided by revelation, has put to flight these and many other visionary theories that were of old dignified with the name of science; and it will go on doing this till ignorance, superstition, and all that is falsely called science, are effectually routed, and this dark world is filled with light. Through its aid the masses are becoming better acquainted with the laws of health, and with the appropriate means of securing physical vigor and length of days; and it is slowly rendering the farmer a more intelligent and skilled laborer, acquainting him with improved methods of prosecuting his work, and enabling him to obtain larger returns for his toil. It has, in short, already wrought important and useful changes in various departments of labor, and it is enabling numerous toilers to labor more intelligently and advantageously than they once could.

But while science has been and is achieving such triumphs over ignorance, how is it with that mightier conflict that has from the beginning been going on between Christ and Belial, between the inspired and unerring standard, and the various delusions that abound? Is Satan vanquished, manacled, and imprisoned? Has the "stone that was cut out without hands become a great mountain, and filled the whole earth?" Have "the kingdoms of this world become the Kingdoms of our Lord," and have earth's kings and queens become nursing fathers and mothers to the Church? Sad to say, the great Insnarer is not yet bound; the contest between him and the Lamb is still in progress, and though now there are probably more on "the Lord's side" than in some past periods, a very large majority are unquestionably still under the leadership and controlling influence of Satan. That subtle and malignant tempter is still plying his arts and sagacious devices with great success, and multitudes are still "taken captive by him at his will." He has a variety of snares with which to entrap men, and he is shrewd enough to adapt every snare to the circumstances and weaknesses of those whom he seeks to victimize. Perhaps no one of all his devices for man's ruin is more depended on by him for success than a *false religious belief*. He is fully aware of the close and almost inseparable connection there is between one's established belief and his conduct, and aware, consequently, of the demoralizing and ruinous tendency of any belief that is essentially unscriptural. Hence, it has from the first been a prime object with him, to invent and disseminate all manner of religious errors and false beliefs. He has succeeded in duping some with the belief that man's existence terminates at death, and that the idea of an endless hereafter, and of a moral governor who scrutinizes our conduct, and will one day summon us to His bar, is only a myth, or a religious scarecrow. Others he has induced to believe that *there is no hell*, nor *any such being as Satan;* and that though there is a God, Who so much "delighteth in mercy" and love that He designs to make *all* His creatures eternally happy. If he finds some foolish enough to believe there will be *some* punishment after death, he persuades them that it is simply reformatory in its purpose, and will not be endless. Still others he cheats with the belief that if they misimprove the probation they now have, a second one will be granted them in the coming world; or else that annihilation is all the evil they will experience if they die in their sins.

Such are a few of the many false beliefs with which Satan has deceived multitudes; and if, in the conflict that is being waged between him and the "King of kings," the side that is now superior in numbers is destined to win, Christ's soldiers might well despond and abandon all further effort. Destined to win! Ah, reader, the time is approaching when this apostate angel will be stripped of his power and subjects, and for a thousand years will be incarcerated and kept from deceiving mankind. The "prince of this world" being deposed and shut up, the glorious millennial reign of Christ will take place, during which He will be acknowledged as the world's spiritual sovereign, and all open opposition to Him and His cause will cease. Iniquity, in all her varied forms and phases, will then "stop her mouth," discord and war will no longer prevail, and "Holiness to the Lord" will then be inscribed on all human enterprises. Before the arrival of that happy period, however, Satan will—as seems probable from Scripture—be encouraged to muster all the divisions of his vast army, and engage in one mighty and decisive struggle for the overthrow of the Lamb. "To the battle of that great day" Satan and his forces will come, perhaps, with high hope and sanguine expectations; but "He that sitteth in the heavens shall laugh," and "the Lord shall have them all in derision." The great conflict will terminate in the utter overthrow of the anti-Christian host, and their Captain will then be bound and imprisoned in the bottomless pit for a thousand years. When that time has expired, being let loose he will be allowed to resume his soul-destroying work for a "little season," and to risk one more battle with the Almighty! Vain effort! Marvelous audacity! Vengeance overtakes him and his deluded followers, and now he is remanded back to the pit, there to remain and be "tormented forever and ever!"

To myself and readers let me propose the anxious question. In the great conflict that is being waged, to which of the opposing sides do we *now* belong—Christ's or Belial's? And on which of them is it probable we shall be found in the great and final day.

SUBSTANTIALISM.

BY REV. GUSTAVE REICHE.

The editorial under the above heading in the September number of the *Microcosm*, is a very timely reminder. The following words in it are especially pertinent: "With *Substantialism* as the standpoint from which to take our systematic

surveys of the here and the hereafter of humanity, the solution of the problem of human life becomes comparatively an easy task." But this important subject seems to be still an impenetrable mystery to a great many scientists and religious teachers. Believing, therefore, that this great and fundamental truth, full of far-reaching consequences, cannot be too extensively treated, I take the liberty of adding a few words in its behalf.

The question "what is substance?" has been variously answered by different scientists. Some have defined substance in such a manner that they finally left nothing of it but the self-contradiction of a vague and mysterious existing nothing. Others have defined it as the "essential quality of matter," consisting, however, of nothing but matter. And there are only too many who are incapable of perceiving any difference between substance and the grossest kind of matter. Even the pulpit is, to a great extent, guilty of such materialism.

Substance is, as the word itself indicates, the substratum, or the underlying entity that causes or gives existence and form to matter.

All matter can be reduced to its elementary gases, and with them the physicist has arrived at the end of the road. If he says that he as a scientist, dare not overstep the physical realm, then he dare not say what caused and still causes these elementary gases to be what they are. But men will ask, and men shall ask, what the entity is—for it cannot be a nonentity—that forms the substratum of matter, and gives it form and existence as such. The only reasonable answer is that it must be its *prior counterpart*, its cause, its substance.

This substance or reality, underlying, causing, forming and governing matter, is just as objective and tangible to the mind and its organs, in its substantial realm, as matter is to our physical senses. And reason tells us that it must be the cause of the *permanency* of the physical world; because the constantly and never ceasing change of matter must have *underlying* and *permanent substances* that cause the material universe to remain what it is. These *underlying*, or *substantial* and *permanent entities* caused the different races of the human family to remain distinct from each other, physically and mentally, notwithstanding their perpetual physical changes by which they have been entirely renewed every seven years. Yes, substance is more permanent than mountains of marble and granite.

Substance, then, must be as multifarious in forms and organisms as matter; yea, even more so. Matter is dead in itself, and all life or power that appears in it and reveals itself through it, is caused by its substance. As "mode of motion" is a senseless definition of life, therefore all activity —repulsion, adhesion, attraction, power and life in the various masses, forms, and organisms of matter, must be caused by their exact substantial counterparts, or corresponding and *living entities;* because every substance or living energy must have its *substantial form* or *organism*, from whence it emanates, otherwise it would be an existing nothing—a self-contradicting absurdity. For anything whatever that has any existence, material or substantial, physical or spiritual, must have a form in which it exists, otherwise it cannot be anything.

The inevitable conclusion, from the foregoing, is that the material universe must have its substantial and corresponding universe, consisting of an innumerable variety of objects. The minister who denies this truth is constantly contradicting himself, because he promises his hearers a higher and better world; while his denial of the substantial world, here referred to, reduces his promised *higher* and *better world* (?) to an existing nothing. I do not want such a heaven. It is worse than the Desert of Saharah. But, nevertheless, a *real substantial* WORLD, with its "*many mansions*," (John xiv: 2), will receive us as soon as we lay down our physical body in that solemn event which we now call death. Then we will find ourselves, and see those who departed this world of matter before us, in a tangible and most perfectly organized, substantial body, fully and most minutely adapted to that real and wonderfully created substantial world, just as our physical bodies are now adapted to this physical world. This is biblical; for the Apostle Paul says, "There *is* a natural body, and there IS a spiritual body," not *will be*, (1 Cor. xv : 44). And the Lord says to the Sadducees, who denied the resurrection, "Now that the dead *are raised* [—not *will be raised*, but "ARE RAISED," *continually raised*,] even Moses shewed at the bush, when he called the Lord the God of Abraham, and the God of Isaac, and the God of Jacob. For He is not a God of the dead, but of the living: for all live unto Him," (Luke xx : 37, 38). The named Patriarchs were thus declared by the Lord as already risen.

Bishop Foster, of the M. E. Church, deserves great credit for his manly and fearless declaration of the important biblical truth—that this material world was never designated to be man's final and eternal destiny; and that consequently, the mere laying down of the material body, and its decomposition into its original unorganized matter, was not the consequence of sin.

Man's creation and existence in this world of matter was only designated to be a temporary condition of probation and preparation for a higher existence. Had man not sinned, then he would at the termination of his successful probation and preparation for heaven, have peacefully fallen asleep, in sweet communion with his Heavenly Father and His angels, to awake in his final destination, above time and space.

The words *Death* and *Life*, as used in the Divine Revelation, have an infinitely higher signification than that given them by us now. The Scriptures mean by death a fearful condition of the soul. So we read, "For in the day"—that very day—"that thou eatest thereof thou shalt surely die." And those who *live* and believe in the Lord SHALL NEVER DIE, notwithstanding the event we now call death, (John xi: 26).

The physical body cannot die, because it never lived; it is only vivified by its spirit, or its inner and substantial body. The physical body has not any more life in it than the meal we eat to sustain it.

A proper conception of the nature and causative character of substance will necessarily assist us greatly in arriving at a clear definition of the nature of all physical laws. They are simply the relations existing between the various forms of matter, and their substantial counterparts, or the relations existing between causes and their effects.

Such a classification will also aid us greatly in properly understanding and explaining the Holy Scriptures; because the verbal and humanly-limited expressions of the Divine Revelation refer always to their substantial or spiritual counterparts.

A clear comprehension of these *inner* and *living* realities will shed floods of light on such expressions as these: "If thy right eye offend thee, pluck it out;" or "If thy right hand offend thee, cut it off."

The expression of our Lord is not without meaning, "The words that I speak unto you, they are spirit and they are life."

Booneville, Mo.

NO CONFLICT.

BY PROF. I. L. KEPHART, A.M.

Only in so far as the one, or the other, or both are misconceived, can there seem to be any conflict between science and religion. Both are facts; both are parts of the universe; both are factors in the established order of things, and, as such, must act in harmony with the entire structure.

Science reveals the established order of things in a certain department of God's kingdom. Its mission is one of advantage and beneficence to humanity. Unlocking, as it does, the mysteries of material creation, and acquainting mankind with the *facts* of physical existence, it becomes a benefactor of the race, and contributes largely to man's elevation in the scale of rational existence. Already the benefits it has conferred—almost innumerable and incomprehensible—are intelligently recognized and acknowledged with profound thankfulness.

The same is true of the Christian religion. In another and a more important department of God's kingdom, religion exists as a fact; and operates with positiveness and effectiveness no less marked, with beneficient results. In many instances as the handmaid of true science, but oftener as the forerunner—the preparer of the way—has it been operating, and has worked and still works, with great proficiency, for the elevating and the blessing of mankind. A glance at the superiority of the Christian nations in intelligence and all that renders life useful, happy and desirable, is sufficient to attest the truth of this declaration.

The benefits of true science to mankind are no more to be questioned than the benefits of the discovery of electricity and the discovery of the power of steam. And the benefits of true religion —Christ-like piety and philanthropy—to the race are no more to be questioned than are the benefits of the light and heat of the sun. They are indisputable facts, "known and read of all men."

But the false theories of science, and the narrow, soul-benumbing, religious creeds, into which have been infused much of the selfishness and bigotry of depraved human nature—these often antagonize each other (as well as antagonize true religion and true science) and between these there often does exist "an irrepressible conflict." In proportion as men mistake false theories for facts of science, in the same proportion does science seem to antagonize the Christian religion; and in proportion as imperfect human creeds are substituted for the pure principles of the Gospel of Jesus Christ does religion seem to antagonize true science.

But, thanks to a munificient God, true science, in the very nature of things, is constantly and effectually working in the direction of the complete overthrow of all that is narrow, bigoted, and false in religion; and true religion is just as surely and persistently working in the direction of the complete overthrow of all that is purely speculative and false in science. The more thoroughly true science, by bringing to light the mysterious facts of material creation, enlightens and ennobles the human intellect, the more rapidly does it move mankind up to a thorough recognition of the fatherhood of God and the brotherhood of man; and the more thoroughly it does this the more effectively does it uproot that religious bigotry and selfishness, that would have us believe that our heavenly Father created certain human souls to be forever damned—or what amounts to the same thing, knew when creating certain human souls that they would be forever lost; and consequently, for such, provided no salvation.

Speaking through the silent, yet irresistible, forces of nature, true science thunders forth the grand sentiment of the Author of nature—"Give every one a chance." No narrowness, no tyranny, no selfishness in this. It breathes a nobleness and a liberality worthy of the great God. This spirit of fatherhood worked its way upward and outward in spite of the fetters of false creeds, until it found expression in the immortal words of the Declaration of American Independence—"All men are born equal," which is but a slightly different wording for the thought embodied in the "golden rule."

On the other hand, true religion brings its refining, crucial test to bear upon scientific investition, winnowing from every theory promulgated, the chaff of mere speculation, washing out the mud and sand of unfounded assertion, and retaining only the pure wheat and yellow gold of scientific facts, the worth and beauty of which only shine the more brilliantly because of their having passed the test of a candid, intelligent scrutiny

Thus science is of vast importance to religion, and religion is of vast importance to science. And the careful observer can not have failed to notice the fact that, as scientific investigators have recognized the claims of religion, in the same proportion have they avoided falling into unfounded, materialistic speculation. The careers of Newton, Brewster, Davy, the Herschels, Franklin, Morse, Agassiz, Hitchcock, and Dana, are noted examples of this fact.

On the other hand, as noted scientists, so called, have discarded the claims of religion and the authenticity of the Bible, to that extent have they fallen into systems of speculation and promulgated false theories, the distinguishing characteristics of which were their disagreement with the teachings of inspiration; and already many of them have been swept into oblivion, to the disgrace and chagrin of the authors to whom they had given a temporary notoriety.

We have a striking example of the truth of this assertion in the statement recently made by the eminent geologist, Prof. Charles Lyell of England, that "in the year 1806, the French Institute enumerated not less than eighty geological theories which were hostile to the Scriptures; but not one of those theories is held to-day." A fitting complement to this is found in the fact that but recently the president of the British Association and the vice-president of the American Academy of Natural Science have admitted as the prevailing feeling of geologists, that "the whole formation of theoretic geology must be re-constructed."

We have another example in point in Prof. Murray's explosion of what he denominates "the Bathybius Delusion," an account of which has been given by Dr. Gray of the *Interior*. He says: "Prof. Huxley, twelve or more years ago, announced the discovery of the original protoplasm, the substratum of all life, which he claims covered the whole beds of oceans. The discovery had long

been the desideratum of biology, and it was hailed with enthusiasm in all scientific circles. By casting a dredge in deep water anybody could draw up and see for himself the Adam and Eve of life—the living mud of the ocean bed. The *Challenger*, a vessel sent out by the United States Government to make deep-sea soundings, and on board of which was Prof. Murrry, as scientist of the expedition—sailed with this theory as a part of its cargo. In the investigations, the sub-oceanic ooze or mud was preserved in alcohol and taken home for closer examination; where the protoplasmic matter was plainly seen, and, as it was supposed, demonstrated. But, in experimenting with it, Prof. Murray discovered that a mingling of sea-water and alcohol gave a flocculent precipitate, which, when it had separated from the liquid, became the identical nucleated protoplasm announced by Prof. Huxley—became the paternal Bathybius itself! On his return home he showed the experiment to Prof. Huxley, and this celebrated scientific delusion vanished! It was a rude shock to the complacent materialistic biologist, who had built extended theoretical edifices and written learned treatises upon it. The protoplasm was nothing but a precipitated sulphate, which any chemist or even amateur could make for himself."

How important, then, that all investigators be careful to distinguish mere theories and absolute facts. How sincerely should all such pray the prayer of Lord Bacon: "We humbly and earnestly pray that living things may not prejudice such as are divine; neither that from the unlocking of the gates of sense and the kindling of the greater natural light, anything of incredulity or intellectual night may arise in our minds toward divine mysteries, but rather that, by our minds thoroughly cleansed and purged from fancy and vanities, and yet subject and perfectly given up to the divine oracles, there may be given up unto faith the things which are faith's. Amen."

IS MAN'S INTELLECTUAL NATURE AN EVOLUTION FROM THE LOWER ANIMALS

BY REV. JOS. S. VAN DYKE.

It is more particularly as it relates to the origin of man's moral, intellectual, and religious nature that the Christian has to do with the theory of evolution. The idea of a relationship between man and the lower animals is conceivable, so far as the mere animal frame is concerned. Confessedly, there are many close resemblences in anatomical structure; indeed, there is nearly absolute identity bone for bone, muscle for muscle—some muscles occuring in man which are of no use, though of use in apes. Similar organs perform like functions. The apes, as well as man, love and have perceive and feel, remember and imagine, will and reason, have definite ideas and the means of communicating them. Professor Agassiz attributes to animals "an immaterial principle similar to that which, by its excellence and superior endowments, places man above animals." When we are asked to believe, however, that our mental faculties, hich are capable of such vast improvement, have been evolved from those of the similadae, too heavy a tax is laid upon our credulity. Most persons, even those who do not believe in the Christian religion, are disposed to accept the account given in the Bible—one of the crowning glories of which is that it recognizes, in all its fulness, the essential dignity of the human family. It presents God as the Author of our being, and the Preserver of our existence, our strength in the struggle with sin, our Comfort in sorrow and our Hope in death.

We should err were we to confine this ennobling conception of the Fatherhood of God to those who possess His revealed will. It has found a place in many systems of faith. Elsewhere than under the influence of Hebrew forms of philosophy, even in nations less cultured than the Greeks and less intellectual than the Romans, has the peasant boasted of a Divine parentage. To others, as well as to the Athenians, Paul might have said, "as certain also of your own poets have said,' 'for we are His offspring.'"

A theory of man's origin, therefore, which is honorable and ennobling, and which comes to us sacred with years and consecrated by the faith of generations, may be expected to be so entrenched within our affections that powerful arguments will be needed to shake the conviction that we are made in God's image—our intellectual faculties being a copy, faint though real, of God's unclouded intelligence—our moral nature a transcript, dim indeed but genuine, of God's approbation of right and His condemnation of wrong. It would seem as though the unbiased investigator must accept the affirmation of M. Quatrefagas, as given in his work on the "Unity of the Human Species;" "Man must form a kingdom by himself, if once we permit his moral and intellectual endowments to have their due weight in clasification."

Does the theory in question possess arguments sufficiently potent to counteract man's predilections? Does it satisfactorily account for man's higher nature? It is conceded that here the theory is weak. Professor Huxley himself admits that the difference between man and the lower animals amounts to an "enormous gulf," to "a divergence immeasurable—practically infinite." Those, therefore, who are inclined to believe that the theory of evolution may be so stated as to contain nothing necessarilly antagonistic to Revelation will be disposed to limit it to man's physical nature, maintain that in other respects at least he was not only made in God's image, but was created without the intervention of natural causes; and since the possibility of the mutation of species is as yet unestablished, and man's descent even in his bodily organism from the monkey rests on inconclusive testimony, most persons will also deem it unnecessary to assume two origins—one for the lower, the other for the higher nature.

Unless God is our Creator how shall we account for that subtile force we denominate mind? To say nothing of the difficulty of accounting for the origin of the mind of brutes—of perceiving how intellectuality can be evolved from matter—how shall we be put in possession of evidence sufficient to induce the belief that "the human mind has gradually developed in the course of millions of years from the mind of the lower skulled animals?" How is it possible to believe that from sources so inadequate those faculties could have been evolved which have compelled nature to unlock her storehouses, affording clothing of every variety and food in such abundance as unaided Nature could not have supplied; faculties, which have devised means of protection against beasts whose fleetness, strength and agility surpass those of man, thus giving the weak an easy dominion over the strong; which have made Nature man's servant, controlling her actions, or bringing his into harmony with

hers? Improvable reason is man's peculiar and exclusive endowment.

The dominion of mind over matter, however, marvelous as it is, is not the strongest proof of man's supernatural origin. The wonderful creations of the human intellect, in musical harmony, in poetry, in painting, in sculpture, in architecture; its marvelous powers of induction, analysis, synthesis, generalization; its ability to form abstract ideas of space, goodness, sin, immensity, truth, honor, eternity, the absolute and the unconditioned, infinite conceptions struggling for expression in human language,—these testify to the existence of faculties which it is almost impossible to conceive could have been developed from lower animals. In like manner, the capability of receiving pleasure from mathematical demonstrations—in fact the ability to prosecute them—and the perception of cogency and beauty in an argument felicitously expressed, certainly afford evidence of an immense chasm between man and the most gifted of the inferior animals. This "immeasurable divergence" becomes even more apparent as we contemplate the achievements of the astronomer, who, in his study of the systems of worlds which move through the unheralded pathways of a universe, has ascertained facts and established laws which reason seems to say must forever have remained beyond the grasp of a being whose mind was evolved from "the medullary tube of the lancelet." To measure the distance, to estimate the size, and to determine the movements of bodies so far distant as to appear mere specks in the depths of immensity is quite manifestly a task too great for any brain that could have been developed from that of the lowest vertibrates. As in imagination we place ourselves at the centre of the solar system, seeing the planets as they move in their several pathways noiseless as true charity; as in fancy we station ourselves at Alcyone, the apparent centre of our nebular system, ascertaining the length of time required for its revolution and learning that it burns with a brilliancy twelve thousand times greater than that of our sun, it will require a logic trenchent indeed to convince us that man owes his origin to anything less than the direct volition of an infinite intelligence. Wondering at the conquests of the human intellect we instinctively exclaim, "It is the handiwork of God."

The mind of man is capable of yet greater triumphs. With the assistance of the largest telescope—itself a marvel of mechanical and scientific genius—the beholder can number, it is said, eighty million suns; some of which are so far distant that the light therefrom requires more than a million years to reach the eye; nay, burning specks have been resolved into suns, each shining with splendor equalling that of our own. Furnished with a knowledge of the higher mathematics, it is even possible to measure their distances from each other, their distance from the earth and their periods of revolution. As we concentrate our thoughts upon these and similar displays of mental power, the overawed soul asks with the emphasis of a well-founded faith: Can man be less than the direct creation of an omniscient intellect? Most persons would no doubt concur in the opinion that it requires no small measure of credulity to believe that the "survival of the fittest" of monkeys could have evolved an intellect capable of such mental processes, even though the survival should have been uninterruptedly carried on during four hundred millions of years; that the intellect of him who has weighed the stars and compelled the lightning to transmit his burning thoughts has been developed from that of the silly brute which wanders in the forests of tropical countries, and obtains a precarious subsistence by feeding upon the uncultivated products of the soil; that because man's framework approaches that of the ape-family, therefore his intellectual faculties are the same in kind, differing only in degree. Assuredly it is easier to believe the declarations, "God made man in His own image:" "The Lord formed man of the dust of the ground, and breathed into his nostrils the breath of life; and man became a living soul."

Having called attention to the greatness of the human intellect as evinced in the achievments of astronomy, it may not be inappropriate to note evidences of its existence where, according to evolutionists, we ought least to expect it—in the language of the Hottentots. We are informed, on the authority of Mr. E. Norris, that though remarkably simple, their language is yet comprehensive and expressive. The nouns have two genders, distinguished by termination. There are four numbers: singular, plural, and two duals; one appropriated to a pair, the other to two individuals. Not merely is the nominative case clearly distinguished from the accusative, but there is a copious declension. Its numerous pronouns, all completely and regularly declined, have "distinct forms for every conceivable modification of meaning," the second persons distinguishing the gender and the first person plural having two forms—one including, the other excluding, the person addressed in the "we." The verbs are conjugated by the addition of syllables. Even conjunctions, which are supposed to characterize highly cultured languages, are quite numerous. Assuredly, on the theory of evolution, it seems remarkably strange that even the lowest savages should evince so great intelligence.

(*Concluded next month.*)

PRINCIPLES OF TERRESTRIAL MAGNETISM.

BY PROF. W. H. H. MUSICK.

The magnetic polarity of the earth is universally attributed to the operation of the principles of electro-magnetism, but the manner of such operation has never been definitely explained.

It is assumed that there is a movement of positive electricity around the earth: opposite in direction to the diurnal rotation,—this current being excited and "kept in motion by the sun heating in turn successive portions of the earth's surface." There follows the well known principle of electro-magnetism; viz., that in every case where a current of electricity is excited, a current of magnetism is also developed at right angles to the electrical current:—hence the magnetic polarity of the earth.

But this explanation is unsatisfying, for the reason, that the foregoing statement, though true so far as it goes, is an imperfect description of the real movement. The general reader will understand the subject better if the statement be rendered thus: the magnetic current moves in a closed circuit round the electrical current in a plane perpendicular to the axis of said latter current.

Place an apple, stem upward on the table in front of you: let the stem represent the north pole of the earth. Now, if you have the means of passing a current of electricity through the apple around the axis (or core) from right to left on the

side next you, your apple becomes a miniature earth with perfect polarity. A magnetic needle near any portion of the surface of said apple will take that position relative to the apple that it usually assumes to the earth at a corresponding position on the earth's surface. The austral current flows out around the blossom, and up across the equator on every side, and down around the stem through the apple in a continuous closed circuit.

Of course, in this rude illustration, I take no account of what we might call the accidental inequalities of the lines of terrestrial magnetic force; which result from the conjoint action of a variety of causes which I have no space here to discuss, {one of which, however, is the inequality in the conducting capacity of different portions of the earth's crust), but shall assume for convenient comparison, that the electrical currents are uniform in each, and that they flow round the spheres on each side of the equatorial plane between the axis and surfaces—somewhat nearer to the latter.

It will be perceived that I hold to the theory, that the electrical current passes through the solid crust of the earth as through a conductor, in opposition to the usual theory of a superficial current; and I will here state very briefly some of my reasons for entertaining this view of the subject.

In the first place, the atmosphere is one of the most perfect insulators known; while the crust of the earth is composed of materials that make the best known conductors. In the second place, the old theory does not admit of a truly scientific explanation of the principles which determine the direction of the lines of magnetic force.

It now remains to consider the cause of the electrical current through the equatorial regions of the earth. I believe that we are all agreed that said current is due to solar influence; but instead of the usual theory of indirect (thermal) influence, I prefer the more scientific theory of direct influence, *i. e.*, induction.

I shall endeavor to explain this matter by reference to the principles of electro-motive induction. According to a law of induction discovered by Lenz, if a conductor be placed near a wire that is transmitting a current of electricity, so long as the relative position of the wire and conductor does not vary, no current well flow in the conductor; but any change in the distance separating the wire and conductor will induce a current in the conductor in said direction as to resist said change. If said distance be increased, the induced current in the conductor flows in the same direction as the current in the wire, and thereby resists the movement by the attraction of the two currents for each other. (Like currents attract each other.) If said distance be diminished the induced current in the conductor flows in the contrary direction to that of the wire, and thereby resists the movement by the mutual repulsion of the currents. (Unlike currents repel each other.)

Now if I make the sun to represent said wire, I trust that I shall not be deemed quite singular in my views; for the greatest thinkers of the age consider the sun to be the direct source of electrical excitation on our planet; for instance see Editorial in June MICROCOSM, on the "Northern Lights."

If this view of the subject be admitted, I shall conclude that the positive solar current is constant, towards the sun, directly through the mass of the earth. One hemisphere of the earth is constantly approaching the sun, and in this hemisphere the direction of the solar current is from west to east — toward the sun.

In this hemisphere a terrestrial current is induced from east to west to resist the approach, by repelling the solar current.

In the receding hemisphere the induced current is from east to west to resist the motion by attracting the solar current which relatively to this part of the earth flows from east to west. We might reasonably expect that the inductive energy would increase in the direction of the equator, and diminish toward the axis—where it would be zero from pole to pole; but the convergence of the magnetic meridians tends to concentrate the magnetic intensity in the direction of the poles.

We would also suppose, that the inductive energy would be greatest about the time of the rising and setting of the sun; and at a minimum during the middle of the day and night.

If it shall be objected to the above theory, that the ratio of the diameter of the earth to the distance of the earth from the sun is inconsiderable, let it be remembered, that the ratio of the intensity of the terrestrial magnetic force, to the intensity of similar forces artificially excited is trifling indeed, when we consider the magnitudes of the agencies employed in the production of each. Moreover, I see no reason to doubt that the inductive influence of the sun is greatly reinforced by the lunar influence which would operate in the same direction.

THE RECIPROCAL INFLUENCE OF THE MIND AND THE BODY.

BY JAS. W. LOWBER, M.A., Ph.D

(*Continued.*)

INFLUENCE OF THE MIND UPON THE BODY

The mind acts upon the body through its threefold states of intellect, sensibilities, and will. The intellect may excite sensations, or it may suspend them altogether. The celebrated John Hunter, says: "I am confident that I can fix my attention to any part until I have a sensation in that part." I am not yet old enough to wear glasses, but think of the time when I may be; and, at this moment, have a sensation on the nose where the spectacles would naturally rest. The influence of intellect upon sensation, will account for the visions of Martin Luther. On one occasion, Luther was engaged in prayer in his chamber; and while he was contemplating the sufferings and death of Christ, there suddenly appeared on the wall a vision of Christ with His wounds looking down upon him. As Christ appears to us only in His word, Luther attributed the vision to a juggling of the devil. Science now fully explains that which was mysterious to the great German Reformer. There are some persons who imagine they see all that they think, and this is a very dangerous condition. Their imaginations become, to them, revelations; and they are sometimes substituted for even the Bible itself. They are simply examples of automatic cerebral action, excited by ideas vividly present in the mind.

The great influence of attention upon the sensory ganglia, is shown in the ability to recall a visual impression after a long interval of time. It is said by Sir. Isaac Newton, that he once looked at the sun for a short time in a mirror. He then went into a dark room, and by thought could have the spectrum return. By intending his fancy upon them, he could have the light and colors as vivid as when he had just looked at the sun. Finally he had to shut himself up in a dark room to divert

imagination from the sun; for if he thought of him, the image would return although he was in the dark. Erasmus once visited Sir. Thomas Moore, who was a firm beliver in the real presence in the Lord's Supper. Moore tried to convert his friend to this belief, and assured him that he would be convinced of its truth by unquestionable evidence. Erasmus on leaving the house of Moore borrowed his pony, and being well pleased with it did not return it; but sent the following lines:

"Should you tire walking,
This hot summer tide,
Believe your staff's dobbin,
And straightway you'll ride."

It is an axiom in science, that every part of the body sympathizes with the mind; for whatever affects the mind, affects the body. Sir. Francis d'Assissi, one day when exhausted by fasting and prayer, imagined that God ordered him to open the Bible that he might therein learn His will. The book was opened three times, and every time at a discription of Christ suffering. The pious monk regarded this as a sign that he should realize the Saviour's suffering more vividly that he ever had before. He carried this so far that he suffered pain in his hands and feet, which resulted in inflammation, and finally terminated in ulceration.

Emotion and will produce a wonderful influence upon the corporeal organization. A person may be very hungry, and receive intelligence which renders him unable to eat at all. A man may have an important speech to prepare, which causes fasting for some time before its delivery. An old woman who was caught one night stealing fowl, said to the man who caught her, "Heaven grant that you may never know again the blessing of being warm." The man complained of cold the next day, which got worse and worse until he died. Science fully recognizes the influence of grief in blanching the hair. The dark hair of the beautiful queen of France became white in one night. Deadly fear out-went time and blanched at once her hair. The human will is the highest element of the mind. It is in the image of God, and free; because, God is free The influence of the will upon the body is very great; because it influences all the other elements of the mind, and they also influence the body. The proper cultivation of the human will is the most important thing in life, both to the body and to the spirit.

That the influence of mind upon the body in the cure of disease is very great, cannot at all be questioned. It is evident that Psychopathy, as well as physical remedies, should be employed in the cure of disease. A little more attention to science will allay the wild enthusiasm manifested in some parts of the country with regard to the Faith Cure Establishment. The medical profession would also be more successful, if greater attention was given to the study of the mind and its relation to the body.

(*To be concluded in next number.*)

THE CAUSE AND CURE OF INFIDELITY.

BY REV. S. C. LITTLEPAGE, D.D.

It is admitted that a knowledge of the character of disease is more than half its cure; a correct diagnosis of moral, as well as mental and physical, maladies becomes therefore the first step in successful treatment.

We assume that infidelity is the development of an abnormal condition of man's moral nature, and all those who attempt to treat it by mental or physical processes are physicians of little value: they apply their remedies to symptoms, as the physician his liniments and lotions; but these cannot effect a cure, and are far less effective in moral than in mental and physical disease, from the fact that there is no *vis medicatrix naturia* on which to rely, while the subject is soothed by paliatives, or homœopathic doses of truth · the whole truth and the help of God must be brought into requisition, or the patient is lost.

We proceed then to the diagnosis, premising that the malady not only affects the Darwins, Huxleys and Ingersolls of the day, but like the plague it affects all classes· deplorable symptoms are seen in our churches, and the ministry of all ecclesiastical organizations. Religion is designed to re-adjust all the relations of man; to control the affections, thoughts and conduct proper to these relations. Every failure in the affections of the heart, the thoughts of the mind or the actions of the life, is an expression of practical infidelity, as it is a violation of the law of God, which is "exceeding broad." In the conduct of life many of the actions of man are in due conformity to his relations. In his thoughts there is less: his imagination is vain; inclinations, evil; in his affections there is less harmony, still they are misplaced, vile, corrupt, and corrupting. Actions spring from the thoughts of the mind: these arise from the state of the affections; therefore, to attempt the correction of moral evil by regulating the conduct, is to trifle with symptoms; to treat the case by controlling the processes of thought, is to trifle with the circulation; we must rise to the source of the evil; must begin with the affections of the heart. The body is the instrument of the mind, and must execute its commands. The mind is the agent of the spirit, and must carry out its behests; responsibility, therefore, in the last analysis attaches to the spirit, the highest part of our nature. Faith is the distinguishing power of the spiritual nature of man, as reason is of his mind, and force of his body. As reason is superior to force, so faith is superior to reason. Force enables us to grapple with our physical surroundings, control and subordinate them to our purposes. So reason enables us to grapple with our mental environment, giving us the mastery over principles which come within the domain of the mind. So faith rising still higher enables us to cognize the spiritual, the unseen; it takes hold of the Infinite, links man to his Maker, restores harmony to his whole being, sending the current of life and health streaming down through the whole mind and body, correcting the thoughts, purifying the imagination, regulating the life, and directing the conduct in accordance with the Divine will. "Without faith (therefore) it is impossible to please God," or to know, much less to do, His will; so that "what is not of faith is sin."

The whole man suffered by the fall, his body became effeminate, the prey of a thousand diseases. His mind became enfeebled, the victim of delusions, deceits, fears and pride. His spiritual nature died, and his moral affections become a poisonous, noxious waste, thus leaving him "without God or hope in the world," out of harmony with universal being, fitly described by Voltaire in his Gospel of the Day and by St. Paul in the first chapter of Romans.

God in His infinite mercy provided the atonement; made to man a revelation of His will in the Bible; to make His will known and the atonement

effective, sent His Holy Spirit into the world to give life and faith to man's spirit, supreme love to his affections and righteousness to his life. "A dispensation of the Spirit is given to every man to profit withal." The investigation of the Bible comes within the province of man's reason; an impartial investigation of the evidences of Revelation invariably leads to the admission of its truth; the truth of the Bible established, from it there is no appeal; its authority is final; its truths carried home to the conscience by the Spirit who inspired it, convict man of sin and utter helplessness; make his soul sicker than calomel ever made his body, or the establishment of his falsehood the mind. His guilt is enormous, but the atonement for it is infinite and must be received by faith alone: nothing but the power of God can save him, and that power is exerted only on condition of his faith: here, the superiority of the faith-faculty is seen. If the man could do something to merit salvation, gladly would he do it, at any cost: if he could reason out by mental processes his salvation, he would do so; but he is "shut up to the faith." "He that believeth shall be saved, he that believeth not shall be damned," is the authoritative statement of the Redeemer; and, while he may believe every doctrinal truth stated in the Bible, he does not believe the supreme fact involving his salvation; his faith in Christ as his personal Saviour is not supreme. There is no room for works here; no scope for reasoning; absolute trust or ruin is the condition of his soul. He feels that he is condemned, and justly; is lost, and powerless to save. In the extremity of his despair he cries to God for help; the Spirit applies to his mind some precious truth, such as, 'If we confess our sins he is faithful and just to forgive us our sins and cleanse us from all unrighteousness;" or, "The Son of Man came to seek and to save that which was lost;" or, it may be, "Ask and you shall receive;" or, perhaps the love of God is set before him in the statement, "If ye, then, being evil, know how to give good gifts unto your children, how much more shall your Heavenly Father give the Holy Spirit to them that ask Him!" The goodness of God in providing salvation through the death of His Son, and tendering eternal life as His own free gift, brings afresh to his mind the guilt of past neglect and the violence done to his own nature by not believing the declarations of His love, and, with entire distrust of all other helps and agencies or wisdom, he throws himself on the broad basis of redemption by Christ Jesus, and is saved. In his absolute self-distrust the faith that embraces God is realized, and he is "born of God; "born of the Spirit." Begotton of Christ Jesus, he is born in love. "Faith in God, the principle of spiritual life," is now supreme: working by love it purifies the heart. "Love to God, the essence of spiritual life," is now the normal condition of his nature: obedience to God, the practical development of spiritual life, flows naturally from the re-adjustment of his moral and intellectual relations, and he is happy; the livest man that lives; for the life he now lives he "lives by faith in the Son of God who loved him and gave Himself for him." His soul is in health, his mind in peace; and, if disease still lingers in his mortal frame, it is sanctified to his good and becomes a blessing. A son of the King, he is heir of all things; and proceeds to organize his life on the principles of the Divine government, in view of his high vocation and immortal destiny. While he walks by faith, he is happy, safe and useful: having overcome the world, he is greater than he that taketh a city.

Sometimes, alas! there is a relapse as in physical disease, and the analogy runs further: the relapse always comes on with a chill, not of the body but of the soul, and by the most natural process in the world. The mind of the converted man is quickened and strengthened in all its functions, and of course there is no field for its exercise so inviting as the system of Divine truth: he has no doubts at all, for every principle essential to the bliss of heaven has become subjective in his personal consciousness. "He knows whereof he affirms." So far as his knowledge extends his judgment approves, and to enlarge the domain of knowledge he proceeds to investigate. For a while reason and fancy luxuriate in the boundless Ocean of Truth: no matter how wide the range of thought, how high the flight of fancy, or strong the wing of imagination, he feels and knows the untrodden heights above, unexplored regions beyond; but the acquisition made, brings with it a consciousness of the power to make it: this conscious power of the mind stimulates ambition to greater achievements in wisdom and knowledge. *Alas*, that desire for wisdom should be the instrument of ruin! But if one is not careful at this point it will stimulate and foster pride: thus the angels fell: thus our first parents fell, and thus thousands have fallen since. Reason assumes the prerogatives of faith: the principles and facts of Divine truth are subjected to the analysis of reason, and they stand the test so far as it is the province of pure reason to go, and the man in his pride concludes that he will not believe what his reason cannot solve; that he will not accept what he cannot understand; and ere he is aware of it he is living by reason and not by faith. "Faith in God, and the principle of spiritual life," imperceptibly die, and the history of the apple is repeated. "Love to God, the essence of spiritual life," receives a chill, grows cold, and, if faith in God is not renewed, the fervor of "enmity to God, the essence of sin," will set up, as, "unbelief, the principle of sin," has supplanted "faith in God, which is the principle of spiritual life:" then follows disobedience to God, which is the practical development of sin." The Divine order must be maintained: man must live by faith in God or die. It is not the province of reason to know God. It is the province of faith.

> Faith lends its realizing light,
> The clouds disperse, the shadows fly,
> The invisible appears in sight,
> And God is seen by mortal eye.

But it is the eye of Faith, not of Reason; and this deleterious unhingement of the Divine order is the cause of infidelity in our churches and ministry to-day. We must *know* all things: outside infidelity demands of us demonstration, and assumes to show the superiority of reason to faith, by demonstrating how all things might have come into being by a process of spontaneous generation, without the hypothesis of an Almighty Creator. Another type of infidelity assumes to demonstrate the immortality of the soul by evoking spirits from "the vasty deep," and having them give us their experience in the undiscovered bourne: the shades of the mighty and the mean they would set before us, that our physical senses might supply the lack of faith from which all these dealers with "familiar spirits" have departed, and, if possible thy would deceive the very elect. These, the elect, are they who walk by faith and not by sight, or reason; keeping in view the polar star, Christ and Him crucified, by which alone the rocks and shoals in life's rough sea can be avoided. After all that can be said of our boasted reason,

the highest truths of which man is capable come by revelation to his faith through the infinite Love. "If any man will do His will, he shall know of the doctrine, whether it be of God." He who is not content "through faith (to) understand that the worlds were framed by the Word of God, so that things which are seen were not made of things which do appear," may study his life away in the vain attempt to construct the *cosmos*, acquire the reputation of a fool for his toil, and lose his soul as the reward of his effort to establish his brotherhood with the brutes that perish.

When Herbert Spencer speaks of God as the unknown, he but utters the ignorance of his own and kindred spirits; but, when he speaks of Him as the unknowable, he is guilty of the egregious vanity of restricting the capacity of all men by the narrow limits of his own dwarfed soul. The progress of science within the last half-century should teach man modesty when he attempts to limit the possibilities of human acquisition; but the truth is, all along the ages men have known God, but in every case by the exercise of their higher faculties, not by the use of the solar spectrum, as the constituent elements of the stars are ascertained, or the microscope, by which the life and functions of animalculæ which elude the unaided eye are made manifest, but by "repentance toward God, and faith in our Lord Jesus Christ." This is God's method, which has never failed, and never will, and all who will may try it. The proud man of reason must become the simple child of faith, or he can never see the Kingdom of God. As well might we expect to master the mysteries of science by muscular strength, as the man of reason to grasp the Infinite by the exercise of his mental powers. "There is a spirit in man, and the inpiration of the Almighty giveth him understanding." God is spirit, and can be only known by the lifting up of the human spirit into the light of His love, by the method He has prescribed. "He that humbleth himself shall be exalted." It is well perhaps to expose the folly of the quibbling scientist, spike his guns or turn them against him, on the principle that we should "fight the Devil with fire;" but in such conflict with the "enemy of all righteousness" our only purpose is self-protection. Infidels, however, are our fellow-men· they have in a malignant form a disease which to some extent affects the most of us: we seek to save them as well as ourselves we cannot do so by unaided reason: unless the power of the Holy Spirit be with us, giving tongues of flame in the delivery of God's truth our weapons will fall as powerless at their feet, as theirs do now at ours. We must be furnished from the armory of Heaven, and with clean hands and pure hearts, filled with the lov of God and our fellow, deliver the whole truth in the demonstration of the Spirit and with power, having full faith in the promise that God will make it effective in "that whereunto it is sent," never forgetting that love wins its way where reason must despair.

Napoleon indicates the true principle and spirit of our contest, in his conversation with General Bertrand on the Island of St. Helena "Alexander, Cæsar, Charlemagne and myself, founded empires; but on what did we rest the creations of our genius? Upon force. Jesus Christ alone founded His empire upon love, and a this hour millions of men would die for Him.' The Christian alone is capable of greeting death with joy, from the fact that he is assured of "an inheritance with the saints in light," of the existence of which his faith is the satisfying evidence; he knows there is an objective reality, answering to every inspiring subjective truth of his consciousness. In a word, the cause of infidelity is our native depravity; its only cure, the Grace of God through our Lord Jesus Christ.

ELECTRICITY THE MOTOR POWER OF THE SOLAR SYSTEM.—No. IV.

BY B. T. KAVANAUGH M.D., D.D.

THE MOON AND THE EBBS AND FLOWS OF THE TIDES.

The average distance of the moon from the earth is 238,818 miles. Its diameter is 2,159 miles, and it makes a revolution around the earth in a fraction less than twenty-eight days. This is called her mean sidereal revolution. To this motion are due her monthly phases. The course of these phases, however, is only completed in a lunar month, or synodical revolution, the mean length of which amounts to twenty-nine days and a fraction. The phases depend upon the moon's position with regard to the sun, which is constantly advancing in the direction of her motion; so that, after completing 360° of her orbit, she has the whole amount of the sun's progress, which is an arc of about 29° to pass over before she can complete her course of phases. The former period is called the sidereal month; the latter the synodic month.

The hemisphere of the moon presented to the sun is always illuminated, except when eclipsed. The illuminated side becomes more and more visible to the earth as the moon recedes from the sun eastward until it reaches the full, when the earth is in a position between the sun and moon, and the full illuminated side is seen.

From the constancy of the physical features of the moon's disk, it is evident that she always presents to us the same hemisphere. To do this, she must turn upon her axis precisely once while making her revolution in her orbit.

The body of the lunar orb is a solid opaque substance, only capable of receiving and reflecting light from the sun.

ITS ELECTRIC CONDITION AND ACTION.

It is not to be supposed that the moon was created as a habitation for men or animals, and therefore it possesses no capacity to produce plants. If this is true, then there is no necessity for an atmosphere, clouds, or rain, and we conclude that it is possessed of neither.

If we can correctly determine the design of the Creator in attaching a satellite to our earth, it will materially aid us in arriving at a just interpretation of its true character and office.

It will not do to say that it was only created to give light by night, for in that case it would always act as at full moon; that is, rise at sunset and set at sunrise. There are manifestly more numerous, and more important, services to be performed by the moon than is generally supposed. After many years of reflection on the subject, we have arrived at the conclusion that the agency and office of the moon is to give diversity of currents and force to the elements employed by Nature to keep up a healthy and vigorous action over all parts of the earth's surface, in connection with the same, and acting the part of a local regulator of atmospheric currents and conditions, and thus perform the part of a sub-agent, under the sun, in giving perfection to the wise and generous provis-

ions of Nature in carrying out her beneficent designs towards the earth and her numerous offspring.

To fulfill and accomplish this design, the moon must be endowed with more power than that of merely reflecting light and influencing the earth by *gravitation*. It receives from the sun a heavy charge of electricity, by which it is armed with the power of attraction and repulsion equal to the functions required of it in the economy of the general laws of the electric system, by which every thing in the solar system is governed.

It is universally admitted that the ebbs and flows of the tides is the result of the action of the moon upon the waters of the ocean. The only question in controversy in regard to the tides is this: Are they produced alone by the supposed law of universal gravitation, as taught by old school books? or by the mutual electric attraction and repulsion between the earth and moon?

If we can fully account for the ebbs and flows of the tides upon the electric theory, we shall not consider it necessary to argue the insufficiency of the gravitation doctrine. When the negative, or dark side of the moon is presented to the illuminated side of the earth, as at the change of the moon, by mutual attraction, we have high or spring tide—this is a well-known fact. Another fact, equally well established, is that when we have spring tide on one side of the earth, there is on the opposite side also another Spring or high tide, where there is neither sun nor moon to attract the waters. What has gravitation to do with this antipodal tide? If no satisfactory answer can be given on the gravitation side of the question, then we offer the following on the electrical side:

It is well known that the ocean is strongly charged on its surface, and for several feet below, with both positive and negative electricity, which are in a neutral state.

When the dark or negative side of the moon is presented to the positive side of the earth, there is a strong mutual attraction between them; and the moon being negative at this time it only attracts the positive electricity found in the water, and repels the negative in an opposite direction.

The waters thereby become polarized, with the positive pole under the moon, which necessitates the formation of the negative pole on the opposite side of the earth.

The earth, being in a magnetic state, forms a connection between the poles; and hence, the antipodal tides are produced.

When the moon is at its full, it is at the opposite side of the earth from the sun, and presents its positive side to the negative side of the earth, when the same result is produced, with the exception that the negative end of the pole is then toward the moon.

These antipodal polarities revolve around the earth, always presenting one of the poles at a point of about forty minutes in the rear of the moon's position.

At the first and third quarter of the moon, and all other times, the tides, in fullness, will correspond to the amount of opposite electric surfaces presented by the earth and moon to each other. But gravitation acts at all times alike, according to the quantum of matter in each body, and can not vary its force.

Here, then, we have demonstrated the fact that the moon exerts a very powerful influence over the waters of the ocean, heaping up its waters on both sides at the same time, and that the force by which it is done is purely electrical.

MT. STERLING, KY., Sept. 27, 1882.

A MATERIALIST IN THE CHASM.

BY ELD. H. W. B. MYRICK.

Prof. John Tyndal calls the immeasurable distance between the motion of brain molecules and consciousness, a "chasm." He says that it is an "unthinkable" matter to predicate consciousness on motion as a result, or a "mode of motion." This is the testimony of that distinguished man. Nevertheless, in the face of this solemn warning, *some* men rush heedlessly into the yawning abyss.

In the *Index* of June 1, is printed an able essay which was read before the Parker Memorial Class in Boston. The *Index*, let me remark, is a first-class, high-toned paper, devoted to the propagation of materialism. It is a fair exponent of scientific materialism and *not* devoted to Ingersolism and that blatant, foolhardy style of slang and abuse. In the article to which I refer, the writer "comes to the scratch," so to speak, and goes over the falls bravely with his colors up. He attacks the problem of consciousness, a problem that awes Tyndall, Spencer, Fiske, and a host of daring explorers in the "inner realm." This hero of the press, grapples the monster in his den, and at one fell-swoop demolishes the popular conception of spirit, God, etc. Yet there are good thoughts scattered here and there which gleam as jewels among the absurdities. Let me note one. "The immortality of man *may be* a fact. All we can say as yet is an open question." Now comes the jewel. "When immortality *is* demonstrated it will be found to be true that immortal man is immortal matter. That is to say, immortality will be found to include not only mind, but matter also." The readers and admirers of the theory advanced in the "Problem of Human Life" can accept *substantially* that idea. The spirit is undoubtedly a *real* something, a refined element of the universe. Our assayest projects himself against Tyndall after this style—"The fact is there is no 'chasm' between thought and motion." And farther along he says he has "repeatedly exposed the sophistry" of the "old argument" that supposed a chasm to exist. That, sounds pretty large at all events. Let us then examine his "illustration" by which he hopes to show that consciousness is "a mode of motion," and which "exposes the sophistry" of such men as Prof. John Tyndall, John Fiske, Herbert Spencer, and Dubois Raymond.

I will quote the whole of the crushing illustration, so that full justice may be given our hero. He says: "I suspend an object over my hand. Hanging there it represents potential mass-motion. I let it fall on my hand. What has taken place? The mass-motion represented by that object falling through this distance is arrested and translated into vibratory motion in the molecules of the hand and of the object itself. A portion of that motion is taken up by the nerves running to the surface of my hand, and is carried along them by a series of molecular waves to the brain. There, the vibratory motion of the nerve is again translated into motion of the molecules or atoms of the cell in which the nerve ends. * * * What we should call that motion I do not know." A little farther he makes a guess, however, and says: "The logical inference is that the time will come when it will be known that consciousness is a *mode of motion* of the atoms that constitute the brain!" The reader now has the "immortal illustration," the "logical (?) inference," and a glimpse at that "old sophistry" as it lies prostrate before Charles Ellis, the prodigy who sheds his luminous ideas on the

Parker Memorial Class. With due reverence we shall look upon his valley of dry bones. We shall even venture to breathe upon them, if peradventure there might not be found somewhat of life in them.

1. He is talking of motion. It is "mass" motion, then it becomes "vibratory" in the hand, and, finally, it is translated into "molecular motion" in the brain. Here he comes to the "chasm," and while catching his breath exclaims: "What we shall call that motion [the last, that in the brain] I do not know." Quite profound. "I don't know." I think not, and I farther think that Prof. Tyndall will hardly hide his head from an ignoramous who tries to expose his sophistry with an "I do not know." But why is he at sea? It is motion all along until it reaches the brain. Why not still be motion? That is what he really holds, but there is such a glaring absurdity in the idea that he will not boldly say it, but dodges round and eventually gives it as a "logical inference." Let us look at the "logic." Consciousness is motion, or a mode of motion. If so, it follows that the motion is consciousness. Then what was it in the mass? or in the hand? If motion, *per se*, is consciousness, why wait till it gets to the brain, to call it that? If consciousness is a "mode of motion" it should begin *at the moment the object begins to fall to the hand*. Consciousness should commence with the object instead of the brain. But Mr. Ellis would perhaps say: "It is true, consciousness is a 'mode of motion,' but it is only when it gets to the brain we call it consciousness." Very true. Now for a little logic. When the object falls on the hand we have a "mode of motion," but there is no consciousness. Why? Because the *hand is not conscious*. It reaches the brain, and there *we become conscious of the motion*. Instead of the motion becoming conscious (I am almost ashamed to write such a monstrous absurdity as having been entertained by a sensible man,) we become conscious *of the motion*. The motion terminates upon something, and the result is consciousness. What is that *something?* Here comes along a motion, whether "molecular" or "vibratory," it matters not; and it finally reaches a something, *an intelligent entity*, that says, "I am conscious of a 'mode of motion' transmitted to me." Not only that, but this intelligence can look on and anticipate the motion. I know, *in advance*, what the "mode of motion" will do for me. I reason, while holding the object, as to the ultimate effect of the fall. Here then we get clear back of motion to an entity, *an intelligence*, as the foundation of consciousness. The motion is not consciousness, but it reaches a something that becomes conscious *of it*. Until Mr. Ellis shows us the precise nature of the *thing* upon which motion terminates, and demonstrates that this *thing* is not *conscious of the motion*, but is a machine to make the motion conscious of itself, we shall "logically infer" that the "chasm" still exists. He quotes Mansel "To be conscious, we must be conscious of something." One question, let me ask this astute prodigy who says, "I am aware that I am running against the Mississippi of popular belief." The question: Is the "mode of motion" conscious of something, or is *something conscious of the mode of motion*? A plain, common-sense answer to this question will be worth a multitude of "logical inferences."

But as short articles are in order, I reserve other observations for a future paper in the MICROCOSM. Get the *Index*, however, and read Mr. Ellis' article.

GENTRYVILLE, MO.

SPIRITUAL THINGS ARE SUBSTANTIAL.

BY J. R. HOFFER.

Thoughts are not material, nor are the affections matter. The soul is generally believed to be a spirit; but what part of the man constitutes his soul? What do we understand by the term spirit? How unreal spiritual things, in or by themselves, appear, even to some educated Christian ministers, may be known from their speaking of the disembodied spirit of a deceased person finally resuming its body.

A brighter day is, however, dawning in reference to a knowledge of spiritual things. Many persons now believe that spirits do not only exist independent of a material body, but that they thus act, even much more freely than they could while in such a body. This belief is perhaps mainly based, as to the existence of the spirit apart from matter, upon the fact that the physical body of every person is finally dissipated, and often enters into the bodies of other creatures, and even through these and vegetation into other human bodies. That the spirit has greater freedom in this independent state is evident, because the material body is a "dead weight" upon it, greatly retarding nearly all the work designed by the mind and making many important things uncertain and even impossible.

These are self-evident facts: that to exert an influence, a thing must itself exist; and, in order to exist, it must have substances in form. There are, therefore, spiritual substances; and these must have states corresponding to the etherial, gaseous, liquid and solid conditions of matter; for thus alone can the variety be provided that is necessary to life. And for the apprehension of these substances in their several states or conditions, the human spirit must have senses evidently much more perfectly adapted than our physical senses are to the apprehension of material things.

But it may be asked, If we have a spiritual body now, and cannot apprehend spiritual things beyond what the mind grasps, will we ever have power to receive more? In this world the spirit uses a material body to enable it to apprehend natural things; and since matter is crude and dead, it forms a film over the finer avenues of the soul or spirit.

Does any one ask how spirit and matter can exist together without displacing each other? All forces exist thus. Gravity acts through all matter; and, however much the bulk is reduced by compression, it loses no gravity. Transparent substances are not enlarged by admitting light into them. Electricity and magnetism do not increase the size of substances charged with them. And why may not purely spiritual or living substances enter matter without affecting it in a way that is tangible to any of our senses? God, the Creator, is a Spirit; hence all matter is manipulated spiritually.

If we would start out by acknowledging the forces which operate in Nature, to be, what they really are, more real than dead matter—the thing acting as more real than that which is acted upon, although the latter alone makes the action known to us—then we would see spirit to be alone substantial, and matter as an effect of it. In looking upon a work, as a picture or machine, we acknowledge the painter or mechanic who made them as greater and practically more real than their work. Let this principle be carried through matter into spirit, and it will shed much light on this subject, too thoughtlessly regarded as mysterious and beyond human comprehension.

Shall Revelation, man, and a great deal in Nature, remain a mystery because we refuse to ascribe reality to the things which are not tangible to our physical senses, although their effect upon mind and matter are most sensibly apprehended?

MOUNT JOY, PA.

A SPECIMEN LETTER.

[The following from the pen of the Eminent Author, Scholar, and Divine, Rev. Dr. Van Dyke, shows the kind of letters that reach THE MICROCOSM office almost daily.]

A. WILFORD HALL ESQ:

My dear Sir,—I have read a friend's copy of your truly wonderful book, "*The Problem of Human Life*," and have been stirred so deeply, and feel so grateful to you for the production, that I yield to the nearly resistless inclination to communicate with you.

The work is certainly an unswerable argument against the accepted theory of sound—the reasoning being honest, clear, exhaustive, powerful, overwhelming. It is impossible for me to express my profound admiration of the masterly manner in which facts are marshalled against the Wave-Theory, till it is beaten down, pulverized, made into pellets, which are administered to the leading advocates of the absurdity in such doses as must tend to open their eyes. But, alas! I honestly fear that your life,—though for aught I know you may be young yet,—will be too brief to witness the abandonment of the preposterous theory; because scientists, like others, are very slow to acknowledge themselves defeated. But assuredly, ere a half-century has passed, the theory which you have successfully slain will be buried, breeding intellectual death in the scientific world no longer. When relegated to the oblivion it richly merits, your name will be associated with the rational theory which is destined to take its place.

Your refutation of Evolution is simply crushing. I have read deeply and long upon these subjects, and am amazed beyond expression at your unparalleled ability in grappling successfully with Evolution's most powerful arguments, which in many instances are turned against it with irresistible force, producing an utter demolition of the theory which is supposed to be based upon them. In other instances, the reasoning involves the theory in a mass of contradictions from which its ablest friends will never extricate it, no matter how great ability they bring to the tantalizing effort of rebuilding what has been proved to be but a cob-house with scarcely sufficient stability to amuse children for a passing hour. While the reader is gazing upon the ruins of a structure which hundreds have pronounced colossal in dimensions, and founded upon an immovable basis; —while he is experiencing a feeling compounded of contempt and pity for the great men who have been crushed beneath the demolished edifice, he is struck nearly dumb with astonishment at the almost marvelous ingenuity shown in proving that the materials employed by evolutionists could have been wrought, as the author constructs them, into a nobler edifice, whose corner stones are the immortality of the soul and the existence of God! The work is grandly done, and will endure.

No language can voice my admiration of the book. It will live as long as men continue to reason, and will do good till there are no human beings to appreciate ingenuity, originality, strength of style, logical force, heroic adherence to truth and breadth of intellectual grasp. It bears evidence on nearly every page of having been written exclusively for God's honor; and the author, though his name is unknown to fame, is unquestionably immortal. One thing alone would render him so, viz., the manliness with which he grapples, single-handed, with the giant intellects of the age,—closes in a hand to hand conflict, and invariably bears his antagonists helpless to the dust. His peerless courage, and his enviable individuality, remind one of the God-man who could say: "Ye have heard that it hath been said . . . . but *I* say unto you." He appeals from authority to reason, and carries his case simply by the resistless force of his logic. If my voice—either on the platform, in the pulpit, or in a forth-coming book upon which I have been long laboring,—"*The Origin, Primitive Condition, and Antiquity of Man*,"—can do anything toward securing for the "*Problem*" the public favor it deserves, it shall sound often and long. I am willing that my services should be unstinted where my interest has been so greatly aroused.

I have one simple request to make, only one—I desire the honor of being permitted to become acquainted with the author of a book which I regard as a legacy to posterity, the greatest work I have ever read, save possibly one or two. I sincerely desire the opportunity of looking upon the man who has shown himself possessed of the ability and the courage to perform this truly giant task. May I have that honor? I am enough of a "hero-worshipper" to make just this strange request.

Again thanking you for one week of unalloyed pleasure in the reading of your book, and assuring you that I shall make it a subject of study now, I remain, Most gratefully Yours,

JOS. S. VAN DYKE,
Pastor of the Second Presbyterian Church,
CRANBURY, N. J.

ELDER D. PENNINGTON'S LETTER.

BENTON, TEXAS, Sept., 15, 1882.

Editor of the MICROCOSM:

I desire to make an appeal through the MICROCOSM, to every one who has read that paper that he address a note to the eminent scientists, especially Tyndall and Mayer, whose theories have been assailed in the "*Problem of Human Life*," and demand of them a defense of their positions, or, like candid men, that they confess their inability to do so. They can not be uninformed as to the damaging influence the "*Problem of Human Life*" is having upon their theories. Their long silence is forcing many of us to believe that they do not feel themselves able to reply, and that they lack the moral courage to admit that their theories have broken down. Please give the address of the scientists above alluded to, that we may know how to address them. Set me down for twenty copies of "*Universalism Against Itself*." It will be hailed with joy by all who know anything about the former edition. Respectfully,

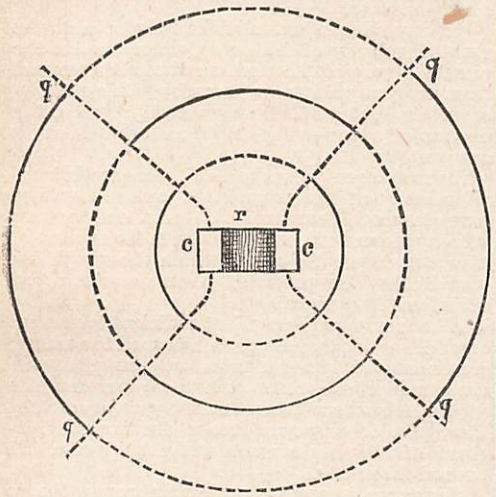
D. PENNINGTON.

[The principal addresses are: Prof. A. M. Mayer, Hoboken, N. J.; Prof. John Tyndall, care of Taylor & Francis, 7½ Red Lion Court, London, England; Prof. T. H. Huxley, same; Prof. Hæckel, Gena (University), Germany; Prof. Helmholtz, Berlin (University), Germany.—EDITOR.]

"INTERFERENCE" VERSUS WAVE-THEORY.

BY CAPT. R. KELSO CARTER.

This figure is found on page 100 of Mayer's treatise on sound, and on page 273 of Tyndall's work. The following explanation is from Mayer.



"This figure supposes the student, looking down on the top of the prongs of the fork. Imagine the prongs swinging away from each other in their vibration. Then the action of the faces c,c, *on the air is to condense it, and this condensation tends to spread all around the fork. But by the same movement, the space* r,r, *between the prongs is enlarged, and hence a rarefaction is made there. This rarefaction also spreads all around the fork. * * * Condensations and rarefactions spread with the same velocity. * * * The full lines represent the middle of the condensed shells of air, while the broken lines stand for the middle of the rarefied shells of air, now along these dotted lines* q,q, *there is evidently a struggle between the condensation and the rarefaction * * * as these actions are equal, and as the air is pulled in opposite directions at the same time, it remains at rest—does not vibrate. Therefore, along the surfaces* q,q, *there is silence."*

What an awful fiasco! What a fearful blunder for a scientific teacher! Why did not the very diagram itself suffice to prove the falsity of every conclusion? Truly love blinds, even when the object of affection be a sounding scientific theory. But let us point out how this diagram demonstrates the utter absurdity of the wave-theory of sound. Prof. Mayer says, that the face *c*, of the fork condenses the air in front of it, thus spreading this condensed pulse in every direction; but, "*by the same movement*," the inner surface of the same prong starts a rarefied pulse, "which also spreads all around the fork." Here we have then a condensed pulse spreading all around, and a rarefied pulse also spreading all around, "by the same movement," and at the same instant of course. It is manifest then that the same air is, at the same instant, both condensed and rarefied; and a "struggle" being evidently going on between them, we can learn the result from the Professor's own words. . . "*As these actions are equal, and as the air is pulled* (?) *in opposite directions at the same time, it remains at rest—does not vibrate. Therefore there is silence.*" Hence we see that beyond any possible question or demur, if the wave theory be true, it follows that when a fork or string, or bell, or any sounding body, vibrates, there must be silence. There is an "Interference" for you! There is no escape from this predicament; none whatever. The utmost distance that can be shown between the condensed pulse from *c*, and the rarefied one from the inner face, is the bare thickness of the fork's prong; and a glance at the diagram will show the observant eye that this thickness counts for nothing, for Prof. Mayer himself draws the hyperbolic lines *q,q*, from the middle of the prong, and also draws the solid and broken lines evenly abreast. How in the name of all sense can a man look on the solid line and call it "the center of a condensation," and then on the broken line, actually forming part of the very same circle of sound, and call it the "centre of a rarefaction," and not see that, not only will the two neutralize each other at *q*, but everywhere else as they go on spreading outward? It will not do for anyone to suggest that the rarefaction is limited to the space between the prongs, for in that case he is met by Mayer's assurance that "these actions are equal," and you can not evidently shut up half a wave of three or four feet in the space of an inch. But do away with one prong and use a single steel bar; the sound will be the same, although of course the lines *q,q*, will not exist. But we will now have more room on the left for the rarefaction. Is it sufficient, however? Let us suppose the bar to make its first vibration. The face *c*, starts a condensed pulse and the other face must start a rarefied pulse at the same instant. If an honest defender of the wave-theory is still alive, he will probably see a chance here, and will contend that this is correct, whatever may be the fault of Mayer's double prong diagram. It may be contended that the face *c*, starts a condensed pulse to the right, and the other face starts a rarefied pulse *to the left*, the two do not travel in the same direction; and the fork or bar forms the proper dividing point between the two. Very evidently there must be a special point where the condensed pulse ceases to advance, and where the retrograde motion or rarefaction begins; but of this more presently. It would be sufficient reply to the above defense to fall back on the double fork, where, if the rarefaction goes to the left, it would lap over in the condensed pulse also going to the left from the other prong, making the same difficulty as at first; while the experimental fact remains that the sound is not diminished in the least. But a conclusive refutation of this fallacy is found in my paper last month, where I showed that the bar vibrating before a resonant tube, meets its own condensed pulse, as it returns up the tube, square in the teeth, without the least injury to anything but the wave-theory. In this case it appears that the half of the condensed pulse coming up the tube is traveling the same way as the whole unobstructed rarefaction in the other side of the bar. Woefully inconsistent theory, isn't it? One pointed fact has been wholly overlooked by all writers on sound. It is this: When the fork advances it condenses the air by a positive and violent push; but when it recedes it does not "pull" the air after it, any more than the piston in a pump pulls the water. The air particles next the fork follow it solely because they are pushed from the other side by the adjacant particles just compressed. At least this would be so if the air were rigid like a rubber rod. If such a rod were struck on the end by the advancing fork, the face would be compressed and would follow the retreating fork solely for the

reason above given. Evidently, then, the rarefaction will depend for its vigor upon the elasticity of the medium, while the condensation will depend for its vigor entirely upon the force of the blow struck by the sounding body. Manifestly these could only agree by a happy accident that would use a fork whose momentum was precisely equal to the elasticity of air at a certain temperature; but Prof. Mayer says, "these actions are equal," and of course if they are not equal, the whole elaborate explanation of the phenomenon of "Interference" tumbles to the ground. Using a fork making 100 vibrations in a second, and another making 1,000, it is as plain as day that the one making 1,000 will strike a wonderfully harder blow upon the air than the slow fork; and by all the laws of matter, ought therefore to drive the air particles much farther and thus cause a larger wave. But unfortunately for the wave-theory, it says that the 100 fork has a wave-length of eleven feet, while the 1,000 fork has a wave-length of one foot. It is easy to avoid the objection that the smaller fork has much less weight, and hence less force in striking, by simply making the long fork very thin, and the short one very thick, until they are equal in weight; when, the vibrations being still the same, the whole theory is hopelessly broken down.

But there is a fundamental reason why the wave-theory can not possibly be true. I will merely state it briefly, and leave the reader to follow it out. When the fork advances it pushes, and thus condenses the air, and the effect of this push is supposed to extend the length of the wave for that particular fork. Right here is a terribly fatal error. *A push does not stop anywhere* (theoretically). If I strike one end of a long iron bar a sharp blow sufficient to move it never so little, the push is instantly felt at the other end, and manifestly there would be no point on the bar where it would not be felt; yet the wave-theory compels me to believe that there would be a number of points on the bar where no push whatever, but rather a retrograde movement would be in progress. Now of course the air, as shown in the *"Problem of Human Life,"* does not retain its place as the iron bar does, but gives way in all directions, precisely as water does when a stick is moved through it; but if it did follow Tyndall's illustration of the row of boys, he would have to account for the utter absence of any rarefaction whatever. The first boy pushes the second, he the third, and so on to the last; and Prof. Tyndall gravely assures us that the sound travels through the air in precisely the same way; totally forgetting that every other boy ought to kick back as it were, to represent the rarefaction—because the push of any particular sound is confessedly felt only a distance of a few feet at the most, and often only an inch or two. Now if Prof. Mayer will explain how it is that the short fork, moving so swiftly, and striking the air so violently, only makes its blow felt a foot, while the long fork, moving with due solemnity, is felt by the air particles eleven feet away, he will solve an important problem, and do something to resurrect his defunct theory. Can he do it?

PA. MIL. ACAD.

GRAVITY AND INERTIA.

BY REV. PROF. S. B. GOODENOW.

Gravity removes a body away from the tangent point (where but for gravity it would be) toward the center of gravity; and the total of this removal accelerates by inertia as the *square of the time*, (gravity being uniform.)

If the body have no side motion, this removal from tangent point, as a new motion, becomes *velocity* of complete accelerated *fall* nearer toward the center; which is additional or diminutional to any falling or rising velocity which the body may otherwise have.

But any side projection of the body, reduces the gravital velocity of fall or approach toward the center; a part of the unchanged total of removal from tangent point now becoming *divergence* by *curvature*, instead of fall by velocity; (as in the descent of a projectile, or of an orbit from its apogee.)

If the side projection be such as to overbalance all velocity of fall toward the center, then the part of removal from tangent point which becomes velocity downward, merely *reduces the amount of rise* away from the center which the projection would otherwise produce; (as in the rise of an orbit from its perigee.)

A horizontal projection just sufficient to prevent any falling velocity or approach toward the center, leaves all the removal from tangent point the same unchanged value (as if there were no side motion,) but now becomes simply an *accelerated divergence* of curvature into a circular orbit, instead of the simple *accelerated velocity* of a fall toward the center.

Curvature is greater or less in proportion to gravity force compared with projection, as seen at the apsides and other points of an elliptic orbit; it is therefore uniform on a circular orbit. But *divergence of curvature* or orbit from a starting tangent, is the same for the same time and gravity whatever the projection, accelerating as the square of the time, and being ever the same, whether directly downward as fall, or reaching to any distance one side.

Thus the accelerating divergence by curvature, or removal from starting tangent to a circular orbit, is the *same value* (increasing by square of the time), as the accelerating fall by velocity of motion from starting point direct toward the center, (so long as gravity is considered as uniform.)

All this follows from the *second law of motion;* and is shown approximately by the circle law of *chords and ver-sines*, as given by all the mathematicians—being proved *exactly* by my diagram and demonstration in the August MICROCOSM.

NOTE.—The approximate method of Newton and others, uses the distance reached from tangent as if a *perpendicular* thereto, and so equal by paralelism to the ver-sine of vertical fall; (*ar* compared with *xm* in my diagram.) And this is so nearly the case for a *very small arc*,—where alone the vertical and orbital motions can be compared, with sufficient uniformity of unchanged gravity,—that the method is practically correct. The difference between the perpendicular and the true curved distance, for a single second of time on the moon's orbit, or even on an orbit about the earth's surface, is so extremely small as to be entirely unappreciable in computation, as Newton shows. And, since the subdivision of the second more and more, makes the difference less and less, until, at the infinitely small arc by which an orbit is momentarily formed, the deviation is *zero*,—therefore, this mode of measurement is thus *absolutely correct* to show the formation of orbital arc by gravity, where alone the demonstration, by the true *curved* distance from tangent, is important, as showing the certainty of this same law for all length's of arc.

ANALYSIS OF GRAVITAL EFFECT.

Taking as the unit 1 of motion, the distance fallen in the unit 1 of time, we have the total, whether of vertical fall or of orbital divergence, made up as follows:

Time, ...	1,	2,	3,	4,	&c.
New gravital motion,	1	1	1	1	
Acquired motion from previous terms, . .		2	2	2	
			2	2	
				2	
Whole new motion, .	1	+ 3	+ 5	+ 7	+ &c.
Total motion, . . .	1,	4,	9,	16.	

It will be observed that the action of gravity is uniform, producing in each term or unit of time the same 1 *new* motion, (by a new velocity given, rising from 0 to 2, and so averaging 1 through each time unit). The rest of the motion in each unit of time is *acquired* from the velocity already given in previous units of time, being as many 2's as there are of those previous terms.

Hence, while the *new gravital* effects of four terms are but 1+1+1+1=total 4, the *whole new* effects (or motion) of those four terms are 1+3+5+7=total 16 (or 4^2). So that, the *direct effect of gravity*, or the new motion caused by it in each moment imparting its force, is *but a small part of the whole result*, or accelerated motion reached as the remote effect of gravity.

If we *halve* the unit of time, making twice as many terms to the same time, (say eight instead of four,) the new gravital effect in each of these halved times is but one-*fourth* as much, (the total effect ever varying as the *square* of the time). So that, while the whole *direct* effect of gravity in the eight terms thus becomes 1+1+1+1+1+1+1+1 =total 8 quarter-values (=only 2), the *entire* effect (remote as well as direct) becomes 1+3+5+7+9+11+13+15=total 64 (or 8^2) quarter-values (=16 as before). And thus the direct effect of gravity is but 2-16 or $\frac{1}{8}$ of the whole effect, when reckoned in this way; whereas we found it $\frac{1}{4}$ of the whole effect for the same time, when we used a unit of time twice as long. Now the time may be divided up indefinitely, by which means the *direct* effect of gravity will be reduced in the same proportion, or at last to an infinitesimally small value. And this is the true account of the force.

Gravity, as to its direct unaided effect, is an extremely feeble force, (as all astronomers state). It produces not even one "sixty-fourth of an inch in a second," as Dr. Hall fixes it, (for he has no right to stop at that degree of sub-division,) but an *infinitesimally small* measure of fall. The motion or divergence produced by gravity is mostly but its *remote* result, being the direct effect of *inertia* coöperating with gravity, as with every repetitious or continuous force, and so enlarging its slight effect direct into a greatly enhanced effect remote. The *inertia of motion*, which is merely *time given* to the effect of force, takes the velocity reached in attaining the direct gravital motion of each term, and continues it on through all the subsequent terms of time. And thus we have a greatly enlarged remote effect of gravity (in the form of acceleration) caused by this time-development or inertia, as a property or law of matter without which neither gravity nor any slow-acting force could produce much result.

Inertia is no active force. It is not the efficient cause producing most of the motion; but is only an instrumental cause enabling the prime cause gravity to procure all these results of motion. It is strictly correct to ascribe the whole results to gravity, as astronomers do; though they are by no means so unwitted (as alleged) not to know, that gravity owes most of its effect to the presence and aid of inertia. Dr. Hall says, that most of the 16 feet fall of a body in a second is "solely the work of accumulated velocity *with which gravity has nothing whatever to do.*" (!) We ask: How could that inertia or continuance of accumulated velocity exist without the gravity which caused it, and through it *caused* the whole 16 feet fall? Surely, then, gravity has something to do with it. It is all caused by gravity, though it is not "the work of gravity alone," but of gravity aided by inertia; and this *in all cases alike*, in the forming of an orbit as truly as in the fall of a stone.

This Dr. Hall denies. He says that, while in the fall of a stone gravity has to be aided to most of its effect, (*i.e.* by inertia,) this is not true of curvature by gravity into an orbit. That, he alleges, "*is necessarily the work of gravity alone* without any assistance" as in the other case. And the reason he gives is, that "there can be no acceleration (or accumulated *velocity*) involved in such motion of the moon" or other body in its orbit. Of course, I reply, there is no acceleration of accumulated *velocity* on a circle; but there *is* an exact equivalent, an acceleration of accumulated *divergence* from the tangent. This divergence or "so-called fall" from the tangent is *the curved distance of the body at any moment from the point on the starting tangent where it would now be but for gravity.* And this distance being called 1 for a unit of time, becomes 3 more (or 4 in all) during the second unit of time, and 5 more (or 9 in all) during the third unit of time, and 7 more (or 16 in all) during the fourth unit of time, and so on; the total being ever as the *square of the time*, just as in the case of a perpendicular distance fallen. This was very clearly shown in my diagram and demonstration of August; and also in the figures given above. There is, therefore, a regular *acceleration of the divergence* producing curvature into an orbit, just as certainly as there is *acceleration of the velocity* producing fall toward the center.

And this acceleration of the divergence is produced by gravity *through the aid of inertia*, just as in the other case. The divergence from tangent in a unit of time being called 1, will be again 1 in the next unit of time as reckoned *anew* from the new tangent of that second term; and this continual 1 of new curvature is the same as the continual 1 of new gravity fall in each term, as we just saw. But while we count this 1 each time from each new tangent, every one of those tangents going before has (by inertia of direction as well as of motion) receded in distance from the new tangent point reached, by the value 2; so that, the whole new divergence at each term from the correspondent point of the *starting tangent*, is the 1 just reached of uniform new gravity effect *plus* 2 as many times repeated as there are previous terms, making 1+3+5+7, etc. This is seen in the August diagram, from *a* to *k*; where 3 at *bs* is the new divergence added to 1 at *ar*, and 5 at *cv* is the new divergence added to 1+3 at *bs*, and 7 at *dt* is the new divergence added to 1+3+5 at *cv*, and so on. Thus the acceleration of divergence is just the same as the acceleration of a falling stone. All the attempts made to give an appearance of difference, is (in the August "reply") by taking the totals of the 1+3+5+7, etc., viz. 1, 4, 9, 16, (the orbital divergences *added* from the start,) and falsely calling these the divergences of the several separate terms, instead of taking the 1, 3, 5, 7, themselves, as plainly given in my diagram and

demonstration, in exact agreement with the several separate terms of a vertical fall. A strange perversion indeed!

Dr. Hall persists in comparing the *total fall* of a stone from the start with the new gravital *curvature of each term!* and, of course, he makes no agreement between them. His argument is this: "The moon's so-called fall or continual departure *from its ever-changing tangent* or rectilinear tendency, [*i.e.* its new curvature each moment, not reckoning in any previous accumulation from a starting point,] *is necessarily the work of gravity alone*, without any assistance from accumulated velocity [or divergence,—of course that is so;] while not the one thousandth part of the stone's fall of 16 feet in a second, [adding up from the start all the preceding accumulations that by a *series of terms* make up the 16 feet,] is the work of gravity itself," or rather of gravity unaided. The *total* of a set of terms in the one case, pitted against the *item values* at each term in the other case! How fallacious. Let like things be compared with like; the single fall 1 of new gravity to each term of a descent, with curvature 1, of new gravity to each term of an orbit; or else the total fall of 16 feet to all the four or more fractional terms of a descent, with the total divergence 16 feet to the four or more like terms of a curvature;—and see how exactly the two cases agree.

The allegation, that either Newton or myself ever gave the 16 feet fall in a second as "*the work of gravity alone* without any assistance" (from inertia,) is certainly out of place. I said, it is "*caused* by gravity *itself*," not by *gravity alone*. The whole fall, the whole divergence *is* "caused" by gravity; and yet the aid of inertia is required, *alike in both cases*. But whatever we take as the unit value, that we ascribe particularly to "gravity *itself*," direct, without reference to its auxiliary inertia.

So then, all the principles and details of operation that apply to a falling stone, apply equally to that stone (or a connon ball) projected so as to revolve (without impediment) around the earth near its surface. The same 16 feet in one second and 64 feet in two seconds of removal from the starting tangent point or line, will be found in both cases. Now this orbit of a cannon ball here can be readily compared with the orbit of the moon, 60 times as far from the center of gravity, and produced by the same cause. And the fact that the moon's divergence from the tangent in any given time is found to be 3600 (or 60^2) times less than the cannon ball's divergence in the same time, is proof positive of Newton's gravitation law of squared-distance-inverse.

BATTLE CREEK, IOWA.

SCIENCE OF LEGAL JUSTICE.

BY REV. M. STONE D.D.

Government rests upon Law. Law claims to be the embodiment of public opinion in a community, regarding the protection of individual rights. Law defines individual rights, and prescribes the limits within which every citizen must keep, or suffer a precribed penalty. Since laws are intended for the benefit of every citizen, therefore every man is bound not only to obey the law, but to use his utmost endeavors to prevent the infraction of it by others, and to detect and expose every known violation of it by others, and discharge his duty in bringing to merited punishment evil-doers impartially. No man has a right to put obstacles in the way of justice, nor conceal crime, or in any way lend his influence to screen criminals from merited punishment. Any man who will accept a fee, or bribe, for helping a villian to escape the penalty of law, shares the guilt of the criminal, and deserves to share his punishment. No man has a right to use trickery, sophistry, prevarication, or lying to help a criminal to escape justice; because all men hold the same relation to the integrity of the administration of justice, and cannot be absolved from this obligation to sustain righteous government so long as they live. All who are in any way connected with the administration of justice, either officially, or professionally, are bound to give their influence to the prompt decision of all legal issues, with as little delay as possible. The tardy execution of law is often nearly equivalent to a defeat of individual rights, in civil cases, and often is impunity in criminal trials. The law profession holds a very important relation to civil government. Property, reputation, liberty, and even life is in the power of that profession. No higher trust was ever held by man in temporal affairs.

There are intricacies in business relations, and questions in regard to personal rights that cannot be unraveled but by minds that have made such things a profound study. The duty of the lawyer is to give his whole influence to the fair and impartial adjustment of difference among men that cannot settle their own. They have no right in their professional character, to "bind heavy burdens upon the shoulders" of innocent litigants, or screen criminals from deserved punishment, any more than any other man has. It is just as wicked to turn a murderer loose to prey upon society, as it would be for the same lawyer to accept a bribe to help slaughter the victim. It is just as wicked to assume the lunacy of a murderer, as the theory of the case, as it would be to swear him clear when there was no reasonable doubt of his guilt; or of his sanity at the time of the deed, as it would be to go before the court and swear to a lie to clear him. *Victory and a fee*, sum up the motives of a vast number of men in that profession. They willingly accept a bribe, virtually, to help villains to evade the law, save their liberty, to continue their depredations upon society, and thus practically annul the law, and, to the extent of their influence, defeat the purposes of civil government.

Hundreds of murderers, and tens of thousands of lesser criminals are turned back into the bosom of society in our country every year by the unscrupulous lying trickery of lawyers. They are practically conspirators with villains against law and order. They move heaven and earth if possible to save the liberty, and often the neck of the vilest and the most dangerous criminals; and all under the specious plea of fidelity to the oath of an attorney, to be true to his client. They ignore *another oath* of a citizen—to be true to the constitution and laws of their own commonwealth, and those of the nation; and that oath involves the faithful execution of law.

The oath of an attorney can by no means be intended to require, justify, or tolerate an attorney in laboring to defeat the purposes of the statute. Legislators could not have done so self-destructive a thing, as to pass laws of great importance to the prosperity to the State, and then swear a set of influential men to defeat the obvious end of such laws. The oath of an attorney was designed simply to bind him to stand by the legal rights of his

client, and faithfully to prevent false and irrelevant testimony; and false interpretations of law and evidence, illegal rulings of the judge, and partiality in his charge to the jury; in other words, to see that his client has a fair trial. Here, his duty ends. But the criminal lawyer always assumes the innocence of his client, and rarely scruples to use any means in his power to defeat justice and turn the villain loose. His duty to his country is totally ignored for the time being, and his obligations to truth and justice, and humanity to his fellow citizens who must suffer from the villain's further depredations, emboldened by his impunity. The trials of high criminals, have come to be regarded as a contemptible farce, a mockery of justice. Trials must be repeated at heavy expense upon mere technical quibbles, not to protect an innocent man, but to wear out the patience of the public, and turn the villain back to repeat his old crimes with augmented boldness and security; he knowing that he can secure influential allies, by the use of a portion of his ill-gotten plunder. "Judgment is turned away backward and justice standeth afar off: for truth is fallen in the street, and equity cannot enter." Not all Lawyers are thus guilty; there are honorable, conscientious men, in that profession. But there are enough of the unscrupulous and mercenary sort to create professional customs that justify such crimes against right, and to keep such professional criminals from being punished as accomplices of rogues deserve. Our country is ruined unless we can have a reformation of the judiciary very soon. The "Star route" trials clearly indicate our danger, and others of the same sort are constantly occuring.

Every lawyer has his choice to be a benefactor to his fellow men by aiding in the adjustment of differences, and reconciling hostile parties, and defending suspected persons from illegal distraint through prejudice, and aiding in execution of the laws; or he may be the patron, ally, and defender of villains, and greatly increase the disorders of society by sending back criminals emboldened by impunity, or he may wear out the patience of the tax paying community by the disagreement of jury which he sought, if he could not get a verdict of acquittal, thus swelling the expenses, till the officers of the law discharge the felon rather than pay the bills that unscrupulous attorneys deliberately occasion. All consideration of the public welfare, and private rights (except those of his client) are swallowed up in his desire for a victory and a fee. It is quite practicable for a lawyer to do his whole duty, without the slightest stain upon his honor, or the violation of the golden rule. If this should become the aim of the profession, two-thirds of the profession might retire to some harmless and useful occupation.

The liquor trafic could be rendered comparatively harmless, were lawyers to refuse to defend these evil-doers. All the difficulty that has been experienced in attempting to regulate, or suppress that ruinous business, has been the work of unscrupulous attorneys, in using lying witnesses, and corrupting the court, or jury. The impudence of liquor dealers, seen in their confident boasting, that if prohibitory legislation is enacted "*it cannot be enforced*," "*we will sell*," arises from what they know of their safety in the hands of the lawyers, who will accept a fee to save them, even at the expense of the ruin of scores of the families of their neighbors, and choice young men who have become the victims of this odious business.

It is amazing that the patient public have not long ago risen in their might to put a stop to this professional interference with the execution of justice.

"KIND WORDS NEVER DIE."

[Hundreds of such letters as the following reach this office monthly. We fill the remainder of this page with a few of these cheerful messages.]

Eld. M. Riddle, Ashland, Ohio, writes:

"Inclosed find $9 for "*Problems of Human Life.*" I have succeeded in obtaining twenty-four copies of the old "*Universalism Against Itself*," and they went off immediately. I have several others who desire a copy, if I can find any more. I will gladly be one of 200 persons who will take ten copies each at $1 per copy as you propose for the revised book. Who among the hosts of readers of THE MICROCOSM will help the editor and the cause by agreeing to take ten or more copies? Thirty-five years ago I sold more than 600 copies of that book in the counties of Richland, Ashland, Wayne, and Holmes in this vicinity; and to my knowledge, the Universalists have not organized a congregation or built a church in those counties since. My opinion is, that you will be perfectly safe in issuing the book at once."

[The book is nearly ready for the press, and the amount of the first edition will depend upon the number of orders received. Let them come in, with the $1 when convenient, and the books will be mailed in the same order as they come from the bindery. Hall & Co.]

—o—

Rev. Geo. F. Dickinson, of Woodbridge, N. J., writes:

"Your "*Problem of Human Life*" has made the reign of evolution of short duration, and the triumph of its chief expounders an exploded bubble of fame. In the author of that book I recognize the man who has given to the Christian and scientific world the greatest bloodless victory that any century has witnessed. To me the book is a source of unalloyed delight, not only for its original line of thought, but for the resistless manner in which it presents and defends the truth. May its author live to see his work recognized to the total extinction of the pernicious theories he has so successfully opposed."

—o—

Prof. James Fagan, Reading, Kan., writes:

"HALL & CO.,

"*Gents:*—Inclosed find $2.50 for the "*Problem of Human Life,*" and one year's subscription to THE MICROCOSM. A friend procured me a copy of the "Problem" out of a library, and I am now reading it at his request. I said to my friend: The idea that the author should attack the undulatory theory of sound! Why, its laws of interference, its velocity, its wave-lengths, have all been actually measured and the theory formulated by the brightest scientific lights of the nineteenth century! What folly, thought I.

Well, I have read the chapters on sound; I am astonished; I can not express my opinion of the work, nor can I put into words my gratitude to the brave author. I feel like a person coming out of darkness into the glare of a thousand lamps. I am dazzled. I can scarcely believe what I see. I must study the work, and for this reason I want a copy of my own. It reads like a novel, only it is so serious. Please let me know if the author has written any other works, if so I must have them."

WILFORD'S ✣ MICROCOSM.

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A. WILFORD HALL, Ph.D., Editor and Prop'r.

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SPECIAL NOTICE.

In our conduct of this journal we desire to give our list of excellent contributors the widest possible latitude for the conveyance of their honest convictions, so long, at least, as this liberty does not conflict with the general aim and scope of THE MICROCOSM. But we wish our readers definitely to understand that we do not hold ourself responsible for the views of our contributors, nor, in fact, even for our own views, as we are liable at any time to change ground on receiving more light, as we have done more than once since this paper was commenced. But, generally, we hope and aim to be consistent. EDITOR.

DOES DEATH END ALL?—NO 2.

In this paper we assume the existence of God as the Creator of the universe, and shall base our arguments for a future conscious existence for man upon that fact the same as if it had been demonstrated beyond all question. In our next, we will undertake to prove the existence of God so demonstrably as to leave no room for doubt in a reasonable mind.

Assuming that God exists and that He created this world with all it contains, we must, in the nature of things, conceive of such Creator as a personal intelligence of infinite capabilities. To have created such a world, with such evidences of design and such beautiful adaptions of means to ends, with so many results everywhere seen in Nature as the effect of complex laws, forces, and processes interacting to accomplish such results, proves to a rational mind that the being, or principle, or power which so originated these processes, designed these adaptions, ordained these laws, and put into operation these forces must be an infinite *intelligence*, a real personality like unto man in point of conscious, entitative being, but incomprehensibly beyond man in the extent of His knowledge, and the sweep of His power in executing His conceptions. That such a being must think, plan, resolve, and reason, cannot be doubted except to fall back upon an utter denial of His existence as the creative power which originated the world with its beauty, order, and utility. If He thinks, reasons, plans, and purposes in carrying out His works of creation, He must exist outside of a physical or corporeal organism, and thus exist a real conscious, personal, and spiritual intelligence. This fact or truth alone, if it be an indisputable fact or truth, settles the question of materialism and sweeps its very foundation from existence. Materialists are of necessity compelled to be atheists. They deny the fact that man exists at all, except as a purely material organism, and insist that all manifestations of vitality or mentality are mere phenomena of motion—the result of molecular action. What causes this molecular action, they do not pretend to explain or even to guess. Here is the chasm which bars their further progress. But, however, unsatisfactory and self-contractory such a view may be even to the minds of avowed materialists, they prefer to adopt its incoherencies and absurdities rather than to yield their convictions to the greater difficulty, as they conceive, of believing that man is a two-fold entity, having an immaterial personality as well as material, visible, tangible form,—the one the counterpart of the other. To admit the real existence of the soul or spiritual entity of man, as one half of his being, is to admit the existence of something entitative beyond the recognition of any of our senses, and beyond the possi-

bility of any scientific test. Hence, the substantial nature of the psychical half of man's being is repudiated as inconceivable; though the very philosophers who thus stumble at such an impossible conception, teach, as scientific, that mental and vital phenomena are the effect of the motions of our physical molecules, and consequently that these molecules move without any substantial or even conceivable cause. To teach, therefore, that what we call life, mind, soul, or spirit, is the result of such motions precludes the possibility of attributing such motions to life or mentality as their cause. Nothing can be both the cause and effect of itself. Materialists thus see movements in all living organisms for which they cannot find a visible or tangible cause. To avoid absolute trouble and discomfiture, they trace such manifest organic motions back to the invisible movements of the invisible molecules of matter, apparently thinking that because these are so far out of sight or beyond the limits of our vision the difficulty is necessarily solved. This is like the pursued ostrich which, as a final resort, thrusts its head into the sand, hoping that by shutting out the light to evade the hunter! But materialists will find, in thus closing their own eyes by assuming an invisible motion of particles too minute to be seen even by aid of the microscope, that they do not begin to solve the difficulty, but only put it one stage farther off. The real cause of such molecular motion, which they assume to be the cause of organic action, remains to be accounted for as much as the visible motions of our hands and feet. Nothing can move, or be moved, without actual contact with substance of some kind. This is a truism, when properly grasped, so axiomatic in the very nature of things that it defies even an atheist of the most materialistic convictions to doubt it. Yet its admission precludes the very fundamental conception of materialistic philosophy; for the molecular motion which, as materialism teaches, causes life, must result from the actual contact of some real substance with such molecules still finer than material atoms, in order to cause their motions and thus cause their vital effect; since no merely physical body, however minute, can move of itself. Simple matter being inert, has no self-moving power. The materialist superficially answers that a stone falls of itself, and a piece of iron moves toward the poles of a magnet of itself, without the contact of any other substance. What shallow philosophy! Let all who imagine that such childish logic can furnish a solution to these mysteries of life and mentality, read the second and seventh chapters of the "*Problem of Human Life*," and they will find that the forces of gravitation and magnetism furnish the most singular and startling proofs of the existence of substantial entities entirely beyond the range of physical or material conditions and outside of the corporeal realm. A stone could not fall or move toward the earth, nor could an armature move toward the poles of a magnet without the agency of a connecting, invisible, and intangible substance drawing the two together. To conceive of such a possibility would be like conceiving of the pulling of a boat to the shore from the middle of the stream without some connecting substance, as a cord, with which to pull it. People are beginning to wake up to this revolutionary view of substance and matter, and to the rational fact, when the idea is once suggested, that every force of Nature is as much a real substance, though not necessarily material, as are the visible and tangible bodies upon which such forces act.

Thus materialistic philosophers, in denying the immaterial part of man as a substantial entity, are forced into a chasm of atheism and thus compelled to deny the existence of an intelligent Creator, since it is manifest to any one who reasons, that no Creator could exist and produce works of beauty and utility, or in fact do anything, unless He were a real substantial being—a veritable, intelligent personality. To deny His entitative existence, because we cannot see Him or recognize Him by our organic senses, is as unwarranted as to deny the all-pervading presence of electricity because it is invisible. We know, however, that electricity exists because of its manifestations; and we know that man exists in a higher sense than his physical organism from what he does, and from what his material body *per se*, could not do—since such a body, without an invisible intangible entity within, could do nothing. So we know that an intelligent God exists from His manifestations. Hence, the vain and self-contradictory efforts of materialistic philosophers to account for the origin of the visible universe from primeval star-dust, while the star-dust itself, with its processes of reconstruction into worlds, remains unexplained! Hence the futility of trying to explain the operations of mentality, feeling, consciousness, by the motions of our material molecules, while no cause can be assigned or even imagined for such molecular motion! Hence the unwisdom of attempting to explain (!) the origin of life by spontaneous generation without an intelligent generator having life to infuse, and through the blind action of laws which never had a lawgiver! Hence, the presumption in essaying to unriddle the mysteries of man's being by assuming his development from the monkey, the reptile, the fish, and the protozoan, through natural selection and survival of the fittest, by a system of logic which necessarily proves that every fish that swims contains the primordial embryonic soul of a Darwin, and that every moneron that slimes the bottom of the sea incloses in its diminutive pellet of albumen the intellect, in a condensed form, of a Sir Isaac Newton!

Notwithstanding this scheme of development of

the physical system of the world from an uncaused patch of nebulous star-dust involves the inexplicable difficulty of myriads of intelligent changes, processes, formations, and adaptations of means to ends;—notwithstanding still vaster myriads of unquestioned evidence of intelligent design attend the countless changes which must have occurred in evolving an Anglo-Saxon Statesman from a horned-toad, yet our model German scientist and our accomplished English philosopher prefer their multitudinous absurdities and their endless abrupt terminations in effects without causes, to the consistent and satisfying admission of an intelligent personal Creator, which, though involving one great mystery, is an infinite solution of all problems both of time and eternity. The proof of the existence of such a God, even to as confirmed a materialist as Prof. Haeckel, would, were he honest, put an end to his materialism—and with it to his vain advocacy of spontaneous generation and subsequent evolution. That consistent scientist would say, Why; if there be an intelligent personal God, able to create at all, why not let Him do the whole work of creation as well as a small part of it, as supposed by Darwin? Why, he would say, make the *first* simple form and then retire forever from the work of creation? "Nonsense!" exclaims the philosopher of Jena University, and we respond Amen! Hence, Haeckel is an atheist by force of logical necessity if evolution be accepted, and in so announcing himself he sets a worthy example to hundreds of gospel ministers including our greatest oratorical lights, who to-day, by advocating theistic evolution, would at once step down and out of their pulpits and avow themselves atheists, but for the inconsistency which they have imbibed from their master—Charles Darwin.

We can only conclude, therefore, that the existence of an intelligent God, as a substantial, personal entity, without a physical organism would be the climax of proof to a consistent thinker—that man must also possess a substantial, personal, and organized entity in addition to his physical and tangible structure. And if such incorporeal personality really exists within this mortal body, what can such entity be designed for, as the work of the incorporeal substantial Diety, but to exist with Him in a psychical realm after its temporary sojourn on this physical earth is accomplished? That an intelligent, personal, incorporeal God exists, and can act and work, and think, and love, demonstrates that an incorporeal human personality can also exist in the same spiritual realm thus adapted to God as His habitation. No possible answer can be made to this proposition. The final conclusion then is, that as God made us with this entitative personality constituted of immaterial substance in addition to our corporeal bodies, and with mental and spiritual cabalities for the conception of His own incorporeal existence, with a longing desire to continue our own existence with Him eternally, it must therefore be accepted as conclusive evidence that such a God creating us with such evident design in our dual structure and being, and with such longing aspirations and capabilities for eternal enjoyment, must have originally designed us for such future state of existence.

The proof, therefore, of man's immortality—the absolute demonstration of it, in fact—may be considered complete wherever the existence of a personal, intelligent God shall have been demonstrated. A man may therefore lift his hand toward heaven and, with glowing confidence, asseverate before all men: If God lives, then I shall live also! If God made me, then I am here for a purpose; and that purpose cannot be satisfied with this ephemeral existence! But if there be no God to have placed me here, then I am here by chance, without a purpose, and consequently *Death ends all*!

REPLY TO PROF. GOODENOW.

We are glad that the gravitation issue is squarely made and definitely presented in the concisely written argument of Prof. Goodenow, found elsewhere, and we propose not to dodge its main feature in this reply; namely, the central assumption of Newton's law that the departure of the moon from an imaginary fixed tangent is the "exact equivalent" (to use Prof. Goodenow's words) of *acceleration* in a falling body on the earth's surface. We propose to meet this aspect of the argument, for upon it the entire law of gravitation rests by common consent. But before taking up that fundamental feature of the case, it is due to the reader and to ourself, that one or two minor points in the Professor's argument should be set aside.

He tries very hard to weaken the force of our position, for the first time, as we believe, found in print, that not the one ten-thousandeth part of the sixteen feet which a stone falls in a second is the work of gravity alone, but that almost the entire fall is due to inertia or accumulated velocity. After this fatal fact had been repeatedly urged upon his attention in our previous replies, he finally thinks that something must be done about it; and now to break its force and treat it as of little consequence, he says, loosely, that "gravity as to its direct unaided effect is an *extremely feeble force, as all astronomers state.*" Yet he does not find it convenient to quote from Newton or any one else to prove what "all astronomers state." We simply deny it, and call upon him for the proof. We deny that any astronomer ever stated such a thing as "that not the sixty-fourth of an inch of the sixteen feet fall in a second was the work of gravity alone," till it was first published in THE MICROCOSM. Now, however, it seems an easy matter for Prof. Goodenow to agree with

this entirely original view and tell us that it is an old idea, that "all astronomers" have so stated, that gravity alone "is an extremely feeble force," and that we have no right to stop even at the *sixty-fourth* of an inch! But why did not Prof. Goodenow, in some one of his former articles in THE MICROCOSM think of this, and see fit to enlighten our readers upon such a remarkable fact as that *gravity*, the very soul and substance of Newton's great law, was such an insignificant factor,—such an "extremely feeble force"—that it does not cause the one sixty-fourth of an inch of the sixteen feet in a second of a stone's fall at the earth's surface?

Prof. Goodenow admits that there is no accelerated *motion*, in the moon's fall; and that its departure from an imaginary fixed tangent like his diagram is only a *resemblance* of acceleration, which, without the least warrant, he assumes to be its "exact equivalent." Hence, beyond all question, gravity *alone* does the entire work of deflecting the moon from a strait line." Surely the mere *appearance* of acceleration furnishes no assistance to gravity! Prof. Goodenow cannot dispute this, since he has repeatedly admitted that but two real agents act on the moon, namely, *projectile force* and *gravity*. Consequently, as the only effect of *projection* is to carry the moon in a straight line, it demonstrates that the entire curvature or deflection from a strait line is the work of gravity *alone*. Nothing can be clearer. Now we ask the significant question, if gravity itself at the earth's surface, in the direct fall of a body, is not really the sixty-fourth of an inch in a second (not the 10,000th of the actual fall), what must its unaided force be at the moon's orbit decreased as the square of the distance, or reduced to one 3,600th of its force here? Could such a trifling energy, so reduced and unaided, do the entire work of pulling the moon from its tangential course with its present tremendous velocity? Yet Prof. Goodenow intimates that "all astronomers" knew this before THE MICROCOSM forced the admission. But if it was really the fact that "all astronomers" knew it, then certainly Prof. Goodenow knew it. Let us see whether he did or not. In the July MICROCOSM, in his article headed—"Off on a Tangent,"—he distinctly states, as he now admits, that the fall of a stone, sixteen feet in a second is "caused by *gravity itself*." But to avoid the consequence of our disclosure which was familiar to "all astronomers," he repeats it in these words: "I said it is caused by *gravity itself*, not by *gravity alone*." But what is the difference? We will now show that there is no difference at all. He was comparing the work of gravity itself and the added work of acceleration or acquired velocity; and to speak of one part of the work as "caused by gravity itself" is the same precisely, and to all intents and purposes, as if he had said by gravity *alone*. For example: We are describing the action of a mill-wheel which is driven both by steam and water power; and, commenting on the action of these two forces, we state that on a certain day, in starting up, the first sixteen revolutions of the wheel were "caused by the steam *itself*." Could it have any other meaning than by the steam *alone*? Plainly not; and any attempt to show a difference between the two seems childish. Hence, there was at least one astronomer, last June, who supposed that the first 6-feet fall of a stone was caused by gravity *alone*, and that of the next 48 feet, 16 more were also caused by gravity *alone!* This is entirely confirmed by his argument, as given in the May number of THE MICROCOSM. These are his words:

"Is not the *fall of a body* 16 1-12 feet, or 193 inches, in a second, a well-known fact? Is it not a *real measure of gravity* [not gravity and acceleration] at the earth's surface? And was it not with this, as a *real, true yardstick*, that Newton measured the fall of the moon each second from its tangent? And does not that measurement show that the 193 inches per second of *gravity fall* here, is 3,600 times as much as the *gravity fall of the moon per second?*"

Now, notice that, in speaking of the 16-feet fall of a stone in a second, as the "real *measure* of gravity" at the earth's surface, he does not think to tell the reader that he meant gravity and accumulated velocity combined; and he forgot to explain that not the 64th of an inch of the 16-feet fall in a second was the work of gravity *per se*, though he was well aware that "all astronomers" knew it! Had he thrown in such a parenthetic explanation as this, it would have been like exploding a magazine under his argument. What would this "gravity-fall" of the stone 16 feet in a second have amounted to as a "yardstick" for measuring the pure-gravity effect at the moon, after cutting off the stick till there was but one 64th of an inch left? Think of Newton pretending to measure the unmixed "gravity-fall" of the moon with a 16-foot measuring-pole, with Goodenow publishing to the world that the said pole was really less than the 64th of an inch long, and that "all astronomers" knew it!

But now comes an ingenious after-thought with which to escape the difficulty. Gravity is the "*efficient cause*" of the stone's fall, while inertia, or accumulated velocity, is the "*instrumental cause*"! Hence, he assumes that it is correct to attribute the whole 16-feet fall in a second to gravity itself! If this be so, why did he so carefully distinguish between gravity and inertia in the 48-feet fall of the next second, still attributing 16 feet of that fall to "gravity itself," and the remaining 32 feet to inertia? This afterthought of "efficient cause," and "instrumental cause" will not work. He had exactly as much reason for attributing the whole 48 feet of the

next fall to "gravity itself" as the "efficient cause," as the first 16 feet. No; depend upon it, the effort to explain it away is not a marked success.

But, returning to the mill-wheel: Let us suppose the *steam* to be the "efficient cause" of its revolutions, because the steam-engine is used to open the gate to let on the water, just as gravity is used to start inertia or acquired velocity into action. Now, suppose the wheel to have made 16 revolutions the first second and 48 revolutions the next, and that Prof. Goodenow, as a mechanical expert, in describing it, declares that these 16 revolutions the first second were the "*real measure*" of the steam-power employed in that mill since these first 16 revolutions were "caused by the steam *itself*," as well as 16 in the next 48, the remaining 32 being the work of the water; could his statement be possibly understood in any other way than that the steam *alone* had caused the first 16 revolutions before this "efficient cause" had turned on the water? But, upon close cross-examination, he explains the matter thus: That the steam *per se* really did not do the 1,000th part of the work of one revolution, the rest being all done by the water; but, since the steam was the "efficient cause" in opening the gate to let on the water, and as the water was only the "instrumental cause," hence it was proper to attribute the whole 16 revolutions of the first second to the steam itself, though manifestly incorrect to attribute the 48 revolutions of the next second to the steam itself, etc., etc.! What would the opinion of such an expert be worth? Just as much as it is now worth in estimating the action of gravity and inertia upon the falling stone, and its relation to the moon's orbital travel; and that, is nothing at all.

Though it is totally incorrect to attribute more than an infinitesimal fraction of a stone's fall to gravity itself, yet the Professor was entirely correct in speaking of the moon's fall from the constantly changing line of tangential force as "the *gravity-fall* of the moon;" because, unlike the falling stone, nothing but gravity does this work of deflecting the moon from a straight line.

Even if we admit a resemblance between the moon's rate of departure from an arbitrary fixed tangent when drawn on paper, and the accelerated rate of the direct fall of a stone, this diagramatic appearance of acceleration is totally wiped out whenever we wipe out the idea of, or necessity for, a fixed tangent, and view the whole matter in a common-sense light, namely: that the only conceivable tangent of the moon is the line of tangential force which keeps at right angles to the earth's pull, and which the moon all the time tends to pursue, and would actually pursue at any instant but for the action of *gravity alone*. This tangent-line cannot be imagined to be fixed even for the thousandth part of a second, unless we also imagine gravity to cease acting for the same time, in which case the tangent would, of course, be fixed, and the moon, in proof of it, would instantly commence following it in a straight line!

But look at the scientific absurdity involved in the very idea of a tangent of the moon remaining stationary behind the line of tangential force, and which the moon could not follow in the event of the suspension of gravity without first taking the back track along its orbit to the point where this fixed tangent started!

Hence the conclusion is irresistible that, as the moon's curvilinear travel can have no accelerated motion, as Prof. Goodenow distinctly admits, and can have no accelerated departure from its *ever-changing tangential line of force*, its deflection must be the work of gravity *alone*. And as the stone's fall is nearly all acceleration, or not the 10,000th part the work of gravity itself, it follows that no imaginable relation can exist between the two kinds of fall, and consequently, that the demonstration of Newton, even as improved by Prof. Goodenow, breaks down.

But really, why should we try to break down Newton's law, when Professors Goodenow and Kemper both have abandoned it as but a "rough measurement," an "approximate method," only "practically correct" even with "very small arcs?" We showed last month, that, beyond all cavil, Prof. Kemper had abandoned Newton's measurement as not a mathematical demonstration at all, but only as "practically" near enough to enable us to guess at the force of gravity at the moon's orbit. But now, Prof. Goodenow out-Kempers the Bethany astronomer in helping THE MICROCOSM to expose Newton's law. In his article in this paper he says: "The method [of Newton] is *practically* correct" "for a very small arc," and calls this "the *approximate method* of Newton"! He then admits, with Prof. Kemper, that the smaller the arc, the nearer direct the pull from the tangent becomes; and adds that, "Since the *division of the second* more and more makes the *difference less and less*, until at the *infinitely small arcs* by which an orbit is *momentarily* formed, the deviation [from right-angle pull] is *zero*,—therefore this mode of measurement [Newton's mode] is thus *absolutely correct!*"

Now, nobody disputes the fact here stated by Prof. Goodenow, that the earth's line of pull from the tangent would be mathematically correct and at exact right angles, if the tangent were "momentarily" changed, as we have all the time insisted, so as to divide up the moon's orbital travel into "*infinitely small arcs*" here made necessary by Prof. Goodenow, that Newton's method may become "absolutely correct!" As a matter of course, if the tangent is shifted "*momentarily*" to match "*infinitely* small arcs," then the pull of the earth's attraction from such tangent must be

"absolutely correct," because it does away with a fixed tangent altogether, just as THE MICROCOSM has claimed from the start to be necessary to make the measurement mathematical! How, in the name of sense or science, can a tangent be "fixed" which changes "momentarily" to match "infinitely small arcs" of travel, so that Newton's method may be "absolutely correct?" Of course, if the arcs are "infinitely small" and the tangential changes take place "momentarily" to correspond with them, it not only wipes out the "fixed tangent" but explodes the very idea of the *accelerated divergence* of the moon's fall from such a tangent; for how can the moon get a measurable distance away from a tangent which is changing "momentarily" to suit the moon's advances through these "infinitely small arcs" of travel? Thus by the common consent of both Goodenow and Kemper, THE MICROCOSM has been right all the time in claiming that Newton's method, if made mathematically or "absolutely correct," must destroy the very idea of a fixed tangent as well as of accelerated divergence from it, upon which his so-called demonstration was originally and solely based. What need we of further witness? We are generously willing that Prof. Goodenow shall have all the glory he can get out of his "truer demonstration" which he is seeking to establish upon the ruins of Newton's "approximate method," as he calls it, which he has so grudgingly assisted THE MICROCOSM in demolishing. But after Newton's method is out of the way, it will be Prof. Goodenow's turn to come to grief with his diagram in trying to twist into its spiral folds the *one-eightieth* of the moon's actual fall which he forgot to include in his "truer demonstration," just as Newton forgot to include it in his "rough measurement." (See reply to *Christian Standard*, elsewhere.)

We now come to the gist of the controversy, as intimated at the commencement of this reply; and upon which Newton's demonstration, as well as that of Prof. Goodenow, stands or falls, namely: the assumption that the deflection of the moon from an imaginary fixed tangent is the "exact equivalent" of accelerated fall on the earth's surface, and, that this orbital travel of the moon away from such tangent is precisely similar to the accelerated fall toward the ground of a projectile when fired horizontally from an elevation.

We will now show that there is no similarity in the two cases, but that they involve distinctly different principles of philosophy. Suppose a ball fired horizontally from an elevation with the usual force of a cannon discharge, it is manifest that it will fall at *nearly* the same rate of acceleration toward the earth as if dropped perpendicularly; the difference being so little that in gunnery practice, scientists have been deceived and have supposed that there was no difference at all. Prof. Goodenow asserts positively that there is no difference. Even Newton supposed the acceleration to be the same in both cases, and all philosophical books teach the same thing. But a more glaring and self-manifest error cannot be imagined, if a moment's reflection be given to the problem.

Suppose the ball to be projected horizontally from the top of a tower 1024 feet high, with only force enough to carry it a few hundred yards from the base of the tower; it is plain that it would reach the ground (supposing the air not in the way) with almost precisely the same accelerated velocity as if dropped perpendicularly,—that is, as the square of the time, say in eight seconds. But suppose it to be fired with force enough to carry it entirely around the earth before it touches the level of the sea, it still has but the 1024 feet in which to fall, or in which acceleration can occur; and this acceleration is slowly occurring, not as the square of the time, but, during the entire time consumed by the projectile in passing around the earth, which would require more than an hour for its accomplishment! Remember that by common consent, there can be no accelerated motion in orbital travel, that is, when the projectile force exactly equals gravity, thus keeping the ball the same uniform distance from the level of the sea. Prof. Goodenow admits this. Acceleration, then, in every true sense, entirely ceases the moment the ball ceases its approach toward the ground; and if it were projected with such force as almost to balance gravity, and thus to require one hundred revolutions about the earth before finally reaching the sea-level, it is plain that the acceleration of this fall of 1024 feet, instead of occurring as the square of the time, would be distributed all through these one hundred revolutions about the earth, gradually increasing in velocity of descent, but taking more than five days to complete it, instead of eight seconds as it would have done if dropped perpendicularly. Hence, we lay down this new law of motion: *That the rate of acceleration of a horizontally projected body becomes less than the square of the time in the exact ratio of the increase of projection, till all acceleration dies out and the motion is converted into orbital travel.* This is as plain and self-evident a principle of philosophy as was ever formulated into science; but who has ever seen such a law stated in any of our text-books? All writers, from Newton down to Prof. Goodenow, have taken the same view of this problem, namely: that a cannon ball fired horizontally from an elevation, whatever the projectile force, *accelerates* in falling as the square of the time, precisely the same as if dropped perpendicularly! But the law here given, with its absolute demonstration, forever disposes of this old philosophy, and shows that this fall of 1024 feet, in which alone *acceleration* can occur, may take eight seconds, eight minutes, or eight hours

to complete its descent to the level of the sea, just in proportion to the amount of projectile force given it.

Thus we see the simple and marked distinction between accelerated fall and the purely orbital travel of a body under the evenly-balanced action of the two forces (gravity and projection) in which no acceleration can occur, since all motion forward or deflective is absolutely uniform. As plain as is this scientific principle, and as undeniable as is the distinction here made, all writers heretofore have mixed the two kinds of fall together in the most indiscriminate and reckless manner. Unscientific writers, like the editor of the *Standard*, are excusable for following the text-books; but Prof. Goodenow is inexcusable after his display of original diagramatic skill in the August MICROCOSM, and should not teach, as he now does, that pure orbital travel, after all accelerated motion has ceased, still has a fall from an imaginary fixed tangent the "exact equivalent" of the acceleration of a stone's fall at the earth's surface. This "exact equivalent" is the last gasp of Newton's law. We will now take this remaining breath out of it and let it peacefully die, by asking Prof. Goodenow which *rate* of "acceleration" of the falling stone he refers to, as the "exact equivalent" of the moon's definite rate of departure from a fixed tangent? Does he refer to the perpendicular rate, or to another rate 500 times slower, as when the body is accelerating all the way around the earth before completing its fall to the sea-level? Prof. Goodenow has here before him the undeniable fact that there may be *a thousand different rates of acceleration of the same falling body*, each rate exactly proportioned to the degree of projection given to it. Then, when he tells us, as the last effort to save Newton's law and his own "truer demonstration," that the definite deflection of the moon from its tangent is the "exact equivalent" of accelerated fall, he should indicate which one of the innumerable diverse rates of acceleration he refers to. A *definite* or fixed rate of departure from a fixed tangent can hardly be the "exact equivalent" of an *indefinite* acceleration which may have any number of diverse and contradictory rates of fall! The truth is, the deflection of the moon from its "momentarily" changing tangent, under absolutely uniform motion, can be no more the "exact equivalent" of accelerated fall than can *falling* be the exact equivalent of *lying still* on the earth's surface, because both happen to involve the action of gravity!

As proof that the real difference here pointed out (between pure orbital travel, in which no acceleration can occur, and the fall of a body toward the earth in which numerous rates of acceleration may take place,) had no clear definition in Prof. Goodenow's mind, read his words in the last paragraph:

"So then *all the principles and details of operation* that apply to a falling stone, apply *equally* to that stone or a cannon ball, projected so as to revolve without impediment around the earth near its surface."

That is to say, "the principles and details of operation" in the falling stone, that may have a thousand different rates of accelerated motion (according to amount of projection) "apply equally" to the same stone revolving about the earth in a circular orbit in which there can be no rate of acceleration at all, and but *one definite* rate of curvature which is here assumed to be the "exact equivalent" of these numerous *conflicting* and *indefinite rates* of accelerated velocity! If "all the *principles* and *details*" of the direct fall of a stone "apply equally to that stone" when projected with sufficient force to give it an orbit about the earth, it follows that the same "principles and details" occur if the stone goes nearly around the earth before reaching the ground, or completing its accelerated fall. Hence, Prof. Goodenow was totally unaware that there was more than one single rate of accelerated fall in a stone, namely, *as the square of the time*. Hence, the erroneous and preposterous assumption that a single definite rate of curvature or deflection from a fixed tangent can be the "exact equivalent" of the accelerated fall of a stone which may have a thousand different and distinct rates of velocity according as the fall is more or less combined with projection.

But we come now to the finale of this discussion, namely, that as the rate of acceleration in gravity-fall gradually diminishes in velocity just in proportion as projection increases till it finally dies out and is lost in orbital curvature, so orbital curvature gradually straightens itself out under still increased projection until curvature is superseded by a straight line through space. We have only to suppose the cannon ball in our illustration, as it is revolving in a circular orbit about the earth, instantly to receive a thousand-fold greater projectile force, and what becomes of this "exact equivalent" of acceleration? The same law that diminishes accelerated velocity till it dies out in circular orbit will also overcome all curvature under this additional projection, till the ball, defying gravity, leaves the earth behind, and darts off through space in a straight line. Thus, also, we leave Prof. Goodenow, and bid adieu to his "truer demonstration."

GRAVITY AT NIGHT AND DAY.

Rev. C. W. Backaus, of New Dundee, Canada, asks us if "gravity is stronger at night than in the daytime." We answer, that sometimes it is, and sometimes it is not. At the time of new moon, or when the sun and moon are both on the same side of the earth, it is plain that their joint attraction

adds to the gravity of the earth on that side where it is night, because all three (earth, moon, and sun) attract in the same direction. In the day-time, however, it is the reverse; because the moon and sun then jointly attract in opposition to the earth. Hence, at the time of new moon all objects on the earth's surface are heavier at midnight than at noon by the added or subtracted force, as the case may be, of sun and moon combined. But this increase or diminution of weight is so very trifling (not the 100,000th part of the earth's attraction alone, owing to the distance of the sun and moon,) that no scales have yet been constructed delicate enough to detect the difference. At full moon, however, when sun and moon are on opposite sides of the earth, the case is reversed. The moon having greater attractive force for bodies on the earth's surface than the sun, owing to greater proximity, it more than counterbalances or neutralizes the sun's attraction, and consequently causes all bodies to be slightly heavier at noon than at midnight; because at noon the moon adds to the earth (on its opposite side) more than the sun can take away. But the idea that there was a difference perceptibly felt in the falling of water on a mill wheel at night, as Mr. Backaus had been assured by a "scientist," is simply preposterous.

THE WAVE-THEORY EXAMINED.

We notice in the *Chester* (Pa.) *Evening News* that a successful lecture against the received theory of Sound was delivered recently by Prof. Carter, before the Institute of Science of that place. The following is the report of the lecture which shows that the arraignment of the old theory is not confined to the pages of the "*Problem of Human Life*" and THE MICROCOSM:—

"Capt. R. K. Carter, of the Pennsylvania Military Academy, was then introduced, and gave a most instructive and interesting lecture upon Sound. He explained Dr. Hall's position in the attack made upon the long received theory of the waves of sound, and certainly succeeded in creating serious doubts in the minds of his hearers, as to the tenability, or, it would be better to say, the truth of that theory, in spite of the fact, that, from the days of Pythagoras, until three years ago, a space of twenty-five hundred years, it has been accepted by all scientific authorities. The impression thus made was deepened by the experiments with which he illustrated his remarks. It would be impossible to give his lecture in such a manner as to do it justice in the space to which we are limited. He showed, that the whole theory of the waves of sound was incapable of proof, was inconsistent with itself, was even absurd in some of the conclusions to which its assumption must inevitably lead. He did not offer to explain at present what theory should take its place; that, was still open to investigation. Dr. Hall had a theory to replace the old one, which, however, was only advanced for discussion and future experiment, and that was, that sound was not a mechanical effect; it was a finely attenuated substance radiating from the sounding body by some unknown process of diffusion, somewhat similar to the diffusion of minute particles which produces the aroma of flowers. Any motion of the medium through which it passes was only incidental.

"When Captain Carter concluded, several questions were asked by different members of the association, and Mr. Bliss instanced some facts and experiments supporting the commonly received theory. These were answered by Mr. Carter, who demonstrated that many of the experiments which have heretofore been regarded as satisfactory, were, on being carefully tested, very far from being so."

UNIVERSALISM AGAINST ITSELF.

As the Editor's first book,—'*Universalism Against Itself*,' thoroughly revised,—will soon go to press, and should be read by all classes, we will send a copy well bound in cloth, postpaid, as a premium for three subscribers to THE MICROCOSM with the money, $3. It will contain a fine steel plate portrait of the author. Retail price $1. Canvassers wanted. No book published for years, has presented such inducements to agents for paying work. The largest possible discount will be made, as we aim more to circulate the book than to secure profits on our sales. More than fifty thousand copies of this work were sold on its first appearance, nearly forty years ago, though it did not then compare with its present revised form.

Inquiries in regard to this work are increasing, and many of our subscribers of different religious denominations write expressing a desire to know what the book contains. To such we will say that next month we expect to make an extract from it, which will show its exegetical character, and its style of reasoning. The work will by that time be in press, and orders (with the $1's) will then be in order. Those who may feel disposed can remit at once and it will aid us in hurrying out the work, and for which we tender our thanks in advance.

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DR. KAVANAUGH'S ARTICLES.

We hope that our scientific readers will carefully consider and even study Dr. Kavanaugh's series of very able articles now appearing in this journal on Electricity as the Motor power of the Solar System. If he is right, it totally overthrows the Newtonian system of astromony, as well as the law of gravity upon which it is based. We are not now prepared to indorse Dr. Kavanaugh's position; and though we believe that Newton's law is badly defective in many respects, we still see no way of avoiding the general conclusion that gravity and projection combined do the work of keeping the moon and the planets in their orbits. Yet we have no prejudice at all against any view, and are

willing, and even anxious to be convinced of the truth of the electric system as the Doctor maintains it, that is if it be true. It is plausible in many of the phases of its presentation; but the cardinal question involved is, whether *magnetic attraction*, however powerful the magnets, will act at such enormous distances in view of the well-known rapid decrease of effect witnessed in the most powerful magnets known. At this point, we confess that our doubts are unmanageable. But we propose to hear the Doctor out before deciding. In reference to the theory of the tides, as taught in the books, we have never been satisfied, and think that the whole thing can be abundantly explained by the action of gravity alone, with one or two things left out of the old theories and one or two new ideas incorporated. Next month, or as soon as we have time, we purpose giving the new theory of our own, and hope to make the matter plain to the comprehension even of the unscientific reader. In the meantime, read Dr. Kavanaugh's theory, based on magnetic attraction, as published elsewhere. We have besides two articles on the cause of the tides from different contributors, combining the action of the moon's attraction and the action of the centrifugal force of the earth as it revolves about the common centre of gravity of the earth and moon. One of these we may also present to our readers. It is evident that the true cause of tidal phenomena is yet in a state of chaos.

NEWTON'S GREAT OVERSIGHT.

We have received a letter from Professor Goodenow, which he marks "Private," in which he berates us in a most petulant manner for charging, as we did last month, that Newton overlooked *one-eightieth* of the moon's fall from the tangent, by ignoring the fact that the moon pulls itself toward the earth with *one-eightieth* as much force as the earth pulls it and in addition to the earth's pull. Prof. Goodenow says we have made ourself "ridiculous" by this "false" charge, and calls it "ludicrous," etc., when it was a fact, as he asserts, that, instead of the "moon's mass" being left out of the demonstration by Newton, "that very allowance is one of its most prominent features," etc.

Now, we have not space in the present number of THE MICROCOSM for a reply to this serious counter-charge; but we promise our readers to answer it most effectually next month, when, if we are spared, we will demonstrate that as great a mathematician and astronomer as is Prof. Goodenow, he does not know what he is writing about. We will show from Newton himself, by quoting his unmistakable words, that no such fact as the moon's added fall of *one-eightieth* by its own attraction of the earth ever entered into his calculations, and that he repeatedly excludes such a conception by his own carefully worded illustrations.

We are, of course, well aware that Newton took into account the "moon's mass" of about one-eightieth in estimating its attraction of the earth, in causing the tides, in pulling the earth constantly out of its otherwise normal position, and thus causing it to revolve in a small orbit around the common centre of gravity of the moon and earth, as distinctly stated last month. But these effects of the moon's attraction, in proportion to mass, are a very different thing from the oversight we charged and illustrated, and have no reference at all to the startling fact in our indictment, that Newton left out of his demonstration entirely the one eightieth of the moon's fall by its attraction of itself toward the earth, in addition to its attraction of the earth toward the moon. We assert again, most positively, that this *eightieth* of the moon's actual fall had no place in Newton's calculation, and that it was plainly and repeatedly excluded by Newton's words and figures. There can be no question but that Prof. Goodenow misapprehends the nature and meaning of our disclosure, and has entirely mistaken the point we made, so confused has he become in following the spiral curves of his "truer demonstration." But, if he will keep his temper till next month, we promise to clear away the mists, and show him not only that Newton left out this one-eightieth of the moon's fall, but that Prof. Goodenow himself absolutely excludes it from his figures. Wait!

THE OCTOBER MICROCOSM.

Prof. Kephart, our able contributor, whose articles on miscellaneous topics are so anxiously looked for and so warmly commended by our subscribers, writes us as follows:

"THE MICROCOSM for October is to hand, and has been carefully read, and I now desire to say that I am more than delighted with its contents. The masterly review of the "Problem," copied from the *Reformed Quarterly Review*, by Rev. J. I. Swander, has given me intense satisfaction. I am also glad to confess that your triumph over Newton's demonstration and law of gravity is complete. Especially is this seen in your reply to Profs. Kemper and Gray. But your article-headed "*The Gravitation Controversy*," in which you disclose Newton's oversight in leaving out *one-eightieth* of the moon's actual fall, caps the climax of argumentative demonstration: and unless you are answered in this particular, Newton's defenders may as well quit. But there seems to be no answer possible, or even conceivable, so clear and convincing is your array of facts, which only again goes to show the folly of considering any theory as settled beyond doubt because it happens to be laid down in the text-books for true science."

ACCELERATED FALL IN AN ORBIT.

[From the *Christian Standard.*]

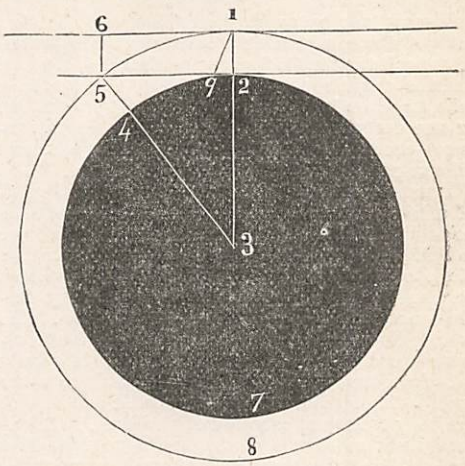
It must be borne in mind, in comparing Prof. Goodenow with Sir Isaac Newton, that they are engaged with problems very different, *in one respect.* Newton's was to get the rate of the moon's fall for a *very short time*—one minute · while Goodenow's is to get the rate for an *indefinite time*, however long. Newton's method was the simplest possible, by a *straight line.* Goodenow's is necessarily much more complex, and by a different line. If Newton had undertaken Goodenow's problem—the measurement of the moon's fall for an *indefinite time*—we have no right to assume what method he would have chosen. We do know that his method was correct for the length of time he used. But it does not follow that it was correct for an indefinite time. On the contrary, the fact that Newton used so short a time is evidence that he knew his *method* of measurement was applicable only to short measurements. But as a short measurement was *all that was needed*, the method was sufficient for the problem in hand.

Let us be clearly understood. We do not say that Newton could not have made a longer measurement, or that a longer measurement would not have answered his purpose as well, or even better. We merely emphasize the *fact* that he did only use a short measurement, and that his method was correct for short measurements. On a very large circle you can measure a very short arc with a yardstick, in a straight line, very correctly. But it does not follow that a long arc can be measured with a yardstick in a straight line. Try it. So, while Newton's method may have been, and was, sufficiently correct for a short fall, it does not follow that it would have been even approximately correct for an indefinite fall, or that Newton would have used it if it had been his object to provide for such a fall.

But the question arises, Did Newton have the correct fall of the moon for one minute? We believe no one questions that it was substantially correct—about fifteen feet in one minute, from the level of any point of the moon's orbit.

Then the question arises, Was that fall of fifteen feet an *accelerated* fall, and according to the law of gravity? If so, it was a demonstration of Newton's theory. And those who wish to upset his theory cannot do it on the ground that he did not make a longer measurement than one minute's fall, or that his method of measuring one minute's fall is not applicable to a fall of any duration; but they will have to measure a longer fall *themselves*, prove that *their own* measurements are correct, and show, finally, that this *longer* fall, thus measured by themselves, is not in accordance with Newton's law. They will find this a very different matter from *assuming* that Newton is responsible for their own assumptions, and then ridiculing their own imaginations.

But the question which is most puzzling to those unused to mathematical problems is this: How can a body fall with *accelerated velocity*, from the level of a given *point* in its orbit, when it is moving at a uniform rate in a (practically) circular orbit? To illustrate this, we call attention to the following diagram. But let it be kept in mind: (1) That the fall of a body at the earth's surface, from a state of rest, is an *accelerated* fall; (2) That the fall of a body projected *horizontally* is also an *accelerated* fall, and that it falls at the *same rate* as if it fell from a state of rest. For instance (the air being removed), a ball fired horizontally from the top of a tower 257 feet high, will reach the ground in precisely the same time, whether the horizontal velocity be less or more—namely, in four seconds. This being premised, we introduce a rough diagram:



By a stretch of the imagination we suppose the black surface to represent the earth; the line 1, 2, at the top, to represent a tower of considerable height, and the circle, 1, 5, 8, to extend, at that distance from the surface, around the earth. If a ball be dropped from the top of this tower, it falls with *accelerated velocity* to the earth. Also, if it be fired horizontally, *at any velocity*, from the top of the tower, it falls the same distance, in the same time, with accelerated velocity. If we suppose the tower to be of such a height that the body will fall from the top in five seconds, then, if it be fired horizontally from the top, so as to be thrown a mile in five seconds, it will fall precisely the height of the tower in that time; or if it be thrown horizontally ten miles in five seconds, it will in the same time fall the height of the tower. Returning to the diagram: If a ball be dropped from 1, and a similar ball be fired horizontally from the same point, at the same instant, they will reach the level of the foot of the tower at the same instant, whether the ball be fired only as far as 9, or as far as 5, or any intermediate point. That is to say, the accelerated motion *towards the earth* is the *same in every case*, whether the ball be merely dropped, or be fired horizontally, with different degrees of velocity.

But if we suppose the ball to be projected with such immense velocity as to be carried to 5, a point in the circle 1, 5, 8, it is evident that, while it has fallen with *accelerated velocity*, just the same as if it had been dropped from the point 1, it has also been moving in a circle or orbit; and, if its velocity is not retarded, will continue to move in that orbit indefinitely. And, if we suppose the ball to continue in this orbit at a uniform rate, it is evident that every time it passes over the arc 1, 5, it falls with *accelerated velocity* towards the earth, just as if it had been dropped from the point 1 each time. And the same may be shown of any similar arc in the circle 1, 5, 8; that is, from the level of any given point in the circle or orbit, 1, 5, 8, a body revolving in the circle falls with accelerated motion *towards the earth.*

The same will also become roughly apparent to

the eye, if, at a point half-way between 2 and 5, a perpendicular be drawn from that line to the line 1, 6. This perpendicular will be cut by the circle 1, 5, 8, at a point about one-fourth of the distance from the line 1, 6, showing that when the body has traversed half of the distance from 1 to 5 it has fallen but one-fourth of the distance from 1 to 2.

It must not be overlooked, however, that the *scale* of this diagram is vastly out of proportion. If we call the line 1, 2, a second's fall, or 16¼ feet, and the curvature of the earth eight inches in a mile, the line 1, 5, will be only about five miles, or one forty-eight hundredth of the circumference—an arc hardly perceptible to the eye, and differing inappreciably from a straight line.

It must also be taken into account that the *fall* of a body is not, essentially, its passage from one point to another, but the distance it would have to fall from one *plane*, or *level*, to reach another plane or level. If we regard the two levels as permanent and parallel, the problem is very simple—to ascertain the distance between them. This is done in our diagram. But often we have to regard one of the levels as in motion. If a body falls from one level towards another, and that other level is in motion around an axis, if the fall of the body follows the motion of the level, it is evidently not so simple a matter. Instead of on a straight line, the measurement will have to be made on a curve.

Now this is a fair representation of what occurs in the fall of the moon. If we regard that body as falling towards a level, we shall have to regard that level as turning on an axis; for as the direction of the fall is constantly changing, the corresponding change must be represented in the level towards which the fall is made.

This can be easily represented by taking a yard-stick, or long ruler, and laying it along the edge of a table, and parallel with it. Let the edge of the table represent the permanent level, the edge of the ruler the movable. Against the other edge of the ruler set an inverted teacup, or other small cylindrical body. While both levels are stationary, the fall is the perpendicular distance between them, easily measured. But if we now turn the ruler, lying flat on the table, around the cup, closely pressed against it, we have a good representation of the level towards which the moon falls in its revolution. It is at once evident that, except for very short falls, the fall cannot be measured, even approximately, on a straight line.

When the ruler has swept clear around the cup, it will be parallel again with the edge of the table, and very near it. But the fall *from* the edge of the table must evidently be measured *around the cup*, in some such a line as is indicated in Prof. Goodenow's diagram, or, more properly speaking, in curvilinear measurement.

This can perhaps be more readily seen from Prof. G.'s diagram, by using a paper-cutter, or straight edge of cardboard, as the movable level, holding it on the circumference, and noting his lines of measurement as it is swept around in a manner similar to the movement of the ruler about the cup. If anyone is not satisfied that his lines mark the course which the lines of measurement will have to take at each part indicated, they will do well to attempt a correction. For instance, when the turn has been made half around the circle, it will be found that the body is falling in a direction precisely opposite to its direction at the start, or at the point *x*. If, at this point, you wish to represent a *fall from* the first level *to* the level as now situated, how will you go about it if you reject Prof. G.'s method. Try it.

As you sweep the ruler around the cup, it will be found that the point towards which the body is supposed to fall advances at a uniform rate along the ruler. If anyone thinks he can measure fairly to the other level without a corresponding advance along that, let him try it.

As we are writing for those who do not profess a technical knowledge of this branch of mathematics, we have studiously avoided technical terms, and we have confined ourselves to such illustrations as can be easily made available by anyone. We offer the caution, however, to all who are not versed in such matters, to be certain that they have looked at such matters in *all their bearings* before they rely on their own conclusions. When they see the array of figures that Prof. Goodenow finds it necessary to use, they will perceive that the problem is one that cannot be picked up and decided off-hand by every one.

REPLY TO THE "CHRISTIAN STANDARD."

Owing to the great length of our reply to the arguments of Prof. Goodenow, in this number, which cover much of the same ground as those in the "*Standard*" article, as copied above, we have concluded to defer our reply to the latter till next month. We think our readers have all the gravitation criticism this number they can well digest, and we thus give the "*Standard*" Editor, as a return for the "coal of fire" of which he spoke recently, the benefit of a month in advance of our rejoinder, which he can reciprocate, if so disposed, by stating the fact to his subscribers. In the mean time we ask our readers to study the "*Standard*" article carefully, that they may the better be prepared to comprehend our reply when it appears.

THE EDITOR'S PHOTOGRAPHS.

We have, as per contract, and as far as possible, supplied all subscribers to the new volume of THE MICROCOSM with Bostwick's photograph of the Editor free of charge, on receipt of the subscription price. But owing to much cloudy weather we have not been able to obtain pictures fast enough to keep up with the increase of new subscribers, and are now several hundreds behind. Let no subscriber, however, become impatient; as all will be supplied, and as fast as the photographer can print the pictures. Remember that each new subscriber (taking the second volume from the commencement) can have the photograph free, if such desire be expressed.

THE BUSY EDITOR

Sends his regards to his friends, and regrets that he is not able to give more attention to their correspondence. He is positively so overwhelmed with work and care that he now has more than fifty communications, some of them on important

themes, that he has not had time to read. He also has piles of books and pamphlets on various subjects waiting for examination, but with no spare time to devote to such important work. He is still *alone* in the editorial management of this journal which involves many duties and cares besides the writing of long and critical editorals and the study necessary thereto. We hope to have competent assistance in time, when we will try to atone for the neglect which now seems unavoidable, and which the patient reader will try to pardon.

IMPORTANT EXPERIMENT.

Last month we spoke of arrangements now in contemplation for a series of miniature magazine explosions to be conducted somewhere near this city, under the direction of a suitable committee, for the purpose of determining the real effects of such explosions in the breaking of windows or producing atmospheric concussions at a distance. It will be remembered, in illustrating the wave-theory of sound, that Prof. Tyndall, in his published Lectures, page 23, refers to the destruction of windows at the village of Erith by an explosion which took place some miles away, and tells us that it was caused by the sound-pulse or sonorous wave from that explosion, which clasped the buildings in a girdle of intensely compressed air. In reply to this doctrine, which is in strict accordance with the current theory of acoustics, the author of "The Problem of Human Life" charges that it is an entire mistake, based upon the erroneous supposition lying at the foundation of the wave-theory, that sound consists of air-waves, constituted of condensations and rarefactions, and that the louder the sound the greater the atmospheric condensation. In opposing the wave-theory, the author of the "Problem" refers to this necessary teaching of Prof. Tyndall, that it was the sound-pulse which traveled several miles and so condensed the air as to break the windows at Erith, and declares that the sound of the explosion had nothing whatever to do with this damage to the windows; asserting that the compressed wave which circled the village, instead of being produced by the sound, was caused by the instantaneous generation and addition to the air of a large quantity of gas, and that its effect in crowding the air away in all directions thus caused the concussive shock which crushed in the glass. He argues that this effect of compression of the air was entirely distinct from the sound-pulse which occurred by the same explosion. To illustrate this, he further asserts and predicts that in a careful experiment, conducted with suitable apparatus, it would be found that the sound-pulse and the condensed air-wave will travel with entirely different rates of velocity; and that while the sound will travel at one uniform velocity from the start to any audible distance, the compressed air-wave, generated and forced away by the added gas, will be found to have a variable rate of velocity, being swiftest at the start, and that it will get slower and slower the farther it travels, and the less the air becomes compressed. He even predicted in detail that near to the magazine the compressed air-wave would outstrip the sound-pulse, especially if a considerable quantity of powder should be exploded; but that at a distance of some miles away the sound would overtake the condensed wave, pass it, and make its presence known at a station some seconds in advance!

Now, all this reasoning in opposition to the wave-theory, as taught in all our colleges, and these definite scientific predictions have been before the public for more than three years without calling forth an effort to test the matter, to see whether or not Prof. Tyndall was in error, or whether the colleges of the country were not actually teaching for science the most absurd and superficial nonsense in using Prof. Tyndall's Lectures as a text-book.

In that challenge and arraignment of the received theory of sound, it was thus stated—for the first time found in print—that the sound of the explosion does no damage whatever, nor produces any concussion, even to the extent of stirring a feather within a few feet of the magazine; and the author urges upon the scientific institutions of the country a careful test of this important discovery, if it be one, which he claims to have made. Although no definite move to this end has yet been made in any college, we are receiving letters from various scientific students and professors, urging us to inaugurate this test through the columns of THE MICROCOSM. The item of expense is, of course, something; and to help meet it we propose to donate a ton of powder if necessary, to be used in making the series of experiments under the direction of a committee of three or five professors of physics, to be appointed by colleges, one only to be named by us—Capt. R. Kelso Carter, Professor of Higher Mathematics in the Military Academy of Pennsylvania, at Chester.

There are many places near this city suitable for such a series of experiments as would put this question to rest; and, if the views and predictions here reiterated are erroneous, we would be only too glad to publish the fact, and will print in THE MICROCOSM the report of the committee, giving the complete results of such scientific test. We are not only willing to know, and let others know, that we are in error, provided we are, but we are willing to pay for such knowledge, and for the privilege of making it known through these columns. But we have no time to attend to the details of the experiments, and think all the scientists of the country should ask that we do as proposed above.

In addition to the questions here intimated, other important matters in relation to acoustical science could be re-tested, such as the velocity of sound with or against the wind, or in still atmosphere; and, also, whether or not the bending of a window, or its equivalent, is inward or outward by the concussion. One of our correspondents declares Prof. Tyndall to be wrong, from actual observation. We throw out these suggestions, and hope that professors of physical science will not prove indifferent to the importance of the questions involved. The coming season, about June, is thought to be the proper time, which is sufficiently far ahead to make suitable preparations. We are now ready for suggestions.

NOTICES OF THE PRESS.

We have received up to going to press more than 500 notices of our October number from as many different papers scattered all over the country. Out of this number but one fails to speak very favorably of our work, commending it to the attention of their readers as of vast interest to the

scientific and religious world. That one exception is the illiterate and self conceited critic of the Waterbury (Vt.) *Register*, who seems to have taken lessons of the New York *Independent*, and concludes that it is safest to condemn the Magazine without reading it, lest, if he should read, he would be converted and healed of his mental blindness. To be condemned by that sheet, is higher praise than to have its approval.

WHY DISCUSS GRAVITATION?

Several of our readers have asked us why we attach so much importance to the gravitation controversy? We hardly need to answer the question to those who reflect that the present system of astronomy, with our knowledge of the entire solar system, depends to a large extent upon a correct understanding of the laws of gravitation. Those who care nothing for science, and who think that religion alone is all-sufficient for this world as well as the next, will not regard this as important, or that a scientific knowledge of the solar system is worth much attention. To such readers we have other and weightier considerations to present why this attack upon Newton's law of gravity is of the highest importance, if successful, to the scope and bearing of our *Microcosmic* discussions.

The assumed certainty of the truth of formulated science, as taught in our colleges and universities, is the greatest enemy to Christianity that exists. All other grounds upon which modern infidelity rests are as nothing compared to the assumed correctness of the conclusions of modern scientists, which, step by step, have become antagonistic to Divine Revelation, until they have at last culminated in evolution, which abruptly parts with the Bible and starts its new departure in avowed materialistic atheism. Thousands have fallen into these anti-religious conclusions of skeptical scientists without much reflection, simply because *science* (especially when formulated and established by the great modern investigations of such men as Newton, Tyndall, Helmholtz, Haeckel, Darwin, Huxley, and others) has become almost deified as the embodiment of absolute truth. The average thinker concludes that because science, as laid down in our text-books, is infallible and unassailable, it is safe to trust all established science that has been demonstrated by these great modern investigators rather than to rely upon a revelation made thousands of years ago. Hence the assumption of the general truth and certainty of science dangerously induces men to swallow the most pernicious and fatal poisons, because they, too, happen to be labelled as science, and bear the monogram of some eminent Doctor of Philosophy.

This pregnant state of facts induced us, some time ago, to assail the universally accepted theory of sound, and more recently to attack Newton's great law of gravitation; not that there was anything directly anti-religious in these theories, but because, first, we regarded them as false science, and as such believed they should be set aside in the interests of true knowledge; and, second, because they were regarded, by the common consent of the educated world, as the two most unquestionable theories of science found in our text-books.* If these two undoubted theories, supposed to be based upon absolute mathematical demonstrations, as we reasoned, could be broken down and shown to be fallacious, we hoped thereby to become a benefactor to mankind by breaking this scientific spell which has blinded us, and the chains of authority which have almost indissolubly bound us to this scientific car of Juggernaut, which, with its iron wheels, was crushing all life out of religion, and all true religion out of the Church. If the two best-established theories known to formulated science, thought we, can be shattered by impartial criticism, it proclaims with trumpet voice to all mankind, especially to those who take their scientific knowledge at second hand, not to trust any theory however plausible because it may happen to be taught even as demonstrated science, against that religion which involves the highest interests of man, and which has stood unscathed amid the storms of so many centuries. These, kind reader, are our reasons for giving so much prominence in these pages to the discussion of Newton's law of gravitation and to the accepted theory of sound. Hence, no subscriber should grudge the space thus consumed, even if he may not be able fully to grasp the scientific questions involved. Prof. Goodenow recently said, in an article published in THE MICROCOSM, that could Newton's demonstration be shown to be fallacious, "*it would be the most stupendous overturn in science that the world has ever witnessed.*" We may add that it would also be the most beneficial overturn, because it would convince all candid thinkers that no certain reliance is to be placed in the conclusions of scientific investigators, especially those who direct their investigations to the destruction of the world's greatest boon—religion.

*An influential critic—a professor in a leading college—about a year ago, ridiculed our attempt to break down the wave-theory of sound, and said: "He might just as well attempt to break down Newton's theory of gravitation, both alike being established by mathematical demonstration; and we should not be surprised if this iconoclast would attempt Newton's law for his next crusade." How prophetic! Acting upon this cue, we examined Newton's law, and compared its mathematical demonstrations with those of Tyndall and Helmholtz for the wave-theory, with the result now being made public through these discussions.

WILFORD'S MICROCOSM.

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IMMORTALITY.—EXISTENCE AND LIFE.

BY THOMAS MUNNELL, A.M.

Existence is not life. Things without life exist. A dead tree exists; so does a corpse. Imagine two trees of equal height and strength standing side by side, the one clothed with the richest foliage and the other without a leaf. They both exist, but only one has life. The same may be true of two human bodies lying on the same couch; while both exist, only one is breathing the breath of life. Life is something added to existence. There can be no life, animal or vegetable, without existence as its basis, but there can be such a thing as existence without life; and there are even many things having existence that can have no life—such as rocks, the metals, the gases, and all primary elements of matter. These may help to support life, but they neither are life in themselves, nor has the Creator ever infused life into them. The difference between life and existence may be still further shown by the consideration that these lifeless entities may have an eternal existence without having eternal life, or life at all. Everlasting existence, then, is not everlasting life, for as there is such a thing as temporary existence in this world without temporary life, so there may be everlasting existence without everlasting life. With this distinction well in mind, let us advance to another important postulate.

The life which is added to a mere existence consists in, or is caused by, a union with God. The grass of the field has vegetable life by reason of its union with God through one of the natural forces; all animal bodies possess physical life through a union with God by means of another of Nature's great channels; and whenever this connection with God is cut off by the drying up of the vegetable rootlets and the closing of the mouths of all gas absorbents, vegetation dies. Whenever God can no longer be immanent in a vegetable or animal organism, supplying it with the vital fluid, all the bioplasts cease from their labors, and the body is dead. Were this supply kept up forever, we would have everlasting life in things that now live but a few years or decades; and had not Adam by sin cut himself off from such supply in the Tree of Life he would have lived forever. Union with God is life, and separation is death.

Apply the same postulates to the "inner man," and all confusion of thought as to immortality will disappear. Immortality is not undying existence, for as many spirits have existence in this world without "the life of God" (Eph. 4:18), so may they continue in the next, and their everlasting existence will not necessitate or imply everlasting life or immortality. Everlasting life is not everlasting *being*, but everlasting *well*-being. Satan is not immortal in the Bible sense of the word by virtue of his everlasting existence, nor are his angels, nor are wicked human spirits. Unceasing being in any spirit does not involve immortality or eternal life any more than the temporary existence of a dead tree implies temporary life. The channels of spiritual life are all open to the soul, and anyone that is now "dead unto God" may, any hour, be made alive unto Him, and begin that fellowship with Him which is the immortality spoken of in the Scriptures. *This fellowship*, if never abandoned, *becomes* everlasting life because it never ends; but if it were identical with mere unceasing existence inherent in the spiritual organism, we never would have been urged to "*seek* for glory, honor, and immortality" (Rom. 2:7). This seeking for immortality does not imply that without it our spirits would perish with the body, but that a transgressor has no spiritual fellowship with God, and must *seek* it. Here, again, union with God is life, and separation from Him is death spiritually. The question of spiritual life and death relates to the *condition* of the inner man, and not to his *existence*. "He that believeth on Him hath everlasting life"—immortality—has it now. This fellowship begun in this world and continued forever makes everlasting life. "He that hath the Son hath life"—not merely unending existence. "He that hath not the Son hath not life;" and yet he has existence, which plainly shows that immortality and eternal existence are not identical, the former being the infinitely to be desired supplement to the latter. The sayings, "She that liveth in pleasure is dead while she liveth;" and "We know we have passed from death unto life because we love the brethren;" and such like, show clearly that life and death relate to conditions of the "inner man," and not to the continuance or the terminus of his existence. This shows the necessity of seeking that spiritual fellowship with God in this life that it may become our immortality in the life to come.

DEITY—THE HUMAN SIDE.

BY PROF. I. L. KEPHART, A.M.

God exists. Only "the fool hath said in his heart," He does not. Our physical senses satisfy us of the existence of material things. None the less convincingly do our mental faculties assure us of the existence of a supreme, intelligent First Cause. Universally, men believe in the existence of a God. "*There is a highest*," is the voice of both reason and philosophy; hence, there is no necessity for a demonstration of His existence. It is accepted as a fact by the masses of mankind.

But, as to the kind of Being He is, there is (of necessity must have been), and will continue to be, a great diversity of opinion. Men fashion their conceptions of God and the attributes they ascribe to Him after their own ideas, sentiments and character. This must be so. The mind can attribute to God no quality of which it has no conception and will attribute to Him such qualities as predominate in itself. This accounts for the otherwise astounding fact that men have such conflicting ideas of God and His attributes. They build up their ideas of Him out of ideas previously existing in their own minds. Hence the vast difference in the character of Deity as conceived by the lowest savage, by the civilized pagan, and by the cultured Christian philosopher. How contemptible and groveling the gods of the African and Asiatic tribes! The sensual but more enlightened nations ascribe to their gods a controlling passion for sensuality, and look forward to a paradise of immortal beauty, where the passions are to be forever

gratified. The Greeks, being admirers of beauty, ascribed to their gods a passion for æsthetics. The Romans, being haughty and war-like, ascribed to their deities a passion for supremacy and conquest. How different must be the god of which selfish man conceives, from that which the benevolent man conceives. The man of forty years can never go back and take up with deity of which he conceived when a child. Just as his mind has expanded, so have his ideas of God been revolutionized. How different the God of which the intelligent astronomer conceives, from that of which the Rev. John Jasper, with his celebrated declaration, "*the Sun, he do move,*" conceives. How different is the geologist's idea of God, from the idea of him who believes that only six thousand years ago, this earth, with all its vast stores of mineral wealth, was created out of nothing by the Almighty fiat in six literal days.

Now out of this difference in the human opinions formed of the character and attributes of God, have sprung the many different religious beliefs—Pagan, Mohammedan, Brahmin, Jew, Christian and the different Christian sects into which the world is divided. Men tenaciously cling to the God of which they conceive, and from their conception of His character originates a new sect.

But of this one fact all may rest assured, viz., No man ever had, no man in this life ever can have, a completely correct idea of the one living and true God. It is impossible. As well might feeble man attempt to clasp his arms around immensity and lock them on the farther side, as to attempt to condense within the nut-shell capacity of his finite intellect a correct and completely comprehensive idea of the Eternal, Omnipotent, Omniscient Being. Quite as possible would it be for feeble man to take up in his arms this mundane sphere on which we dwell, and walk off with it, as to fully understand the Being and attributes of the All-holy, Everlasting Jehovah. Much as men may differ in their ideas respecting God's character, yet the very extremes of those opinions are not a thousandth part as far from each other as must the most perfect human conception ever formed of His character fall short of what that character really is. The finite mind cannot comprehend the infinite; and the part of Him which we do comprehend is as nothing, compared to the almost infinite part of Him we do not comprehend. No more can His infinite knowledge of Himself be imparted to us than His infinite power can be incorporated in our feeble arms, or His omniscient wisdom be watched by our dim faculties. This thought should impress us with feelings of humility and reverence, as well as with due respect for the religious opinions of others. If some of the stiff sectarians of Christendom could for a moment, see how almost infinitely slight is the difference between their idea of God's character and attributes and the idea of the same as entertained by the sects they oppose, when compared with the difference between what they all believe Him to be and what He really is, would they not hide their faces for very shame? The distance between the creeds and sects is almost infinitely less than the distance of all of them from the real facts in the case. And suppose those who condemn and doom to everlasting woe those of their fellowmen who cannot believe exactly as they do respecting God's character and attributes, were to be dealt with in the same manner *because the conceptions they have formed of His attributes are far from being correct?* Would not the result be terribly crushing to all sectarian bigots? How would such be startled at their own errors, if they could get a glimpse of the true character of Deity.

But, says one, do not the Scriptures reveal to man a correct knowledge of the character of God? Yes, in all things essential to human salvation, they do; but on many minor matters their declarations are so indefinite that, in our present state of knowledge, the wisest and most pious of men are at variance as to what their literal meaning is. This should teach us to treat with deference the opinions of others, and to bid a hearty God-speed to all who practically fear God and work righteousness, even if they do not subscribe to our particular dogmas.

But, with all the great diversity of human conceptions respecting the Deity, there is one point—the essential point—of agreement among all true worshippers. Their ideas respecting His character and attributes may conflict, but in *love* they are the same. The love for God which trembles in the heart of the sincere but untutored, humble worshipper, and from that honest heart reaches out toward the infinite Saviour in aspirations of affection, trust and adoration, are as pure and of the same heaven-begotten quality, as are those that ascend from the devout heart of the most gigantic intellect in Christendom. All the hearts of all those who truly love God, whether on earth or in heaven, are ever in sweet accord; and when one of them is touched with an aspiration of praise, it thrills through the whole train of worshipping intelligences in all the universe of God. Here, then, is the point of similarity between all true worshippers of Deity, despite their many differences of belief—*they all love God,* and love is the same in all hearts and throughout all worlds.

But if men necessarily construct their beliefs respecting God's character out of their own resources of knowledge, out of the ideas they have acquired, what additional importance does this fact attach to the development and training of each moral and intellectual faculty? All true knowledge acquired, whether of physics or metaphysics, whether of a social or moral character, only provides the mind with additional materials out of which to construct a more beautiful and a more perfect conception of the true character of Deity. The geologist, the botanist, the chemist, the mineralogist, the astronomer, the logician, the metaphysician, the moral scientist, the philosopher, how infinitely grand his conception of the character and the attributes of the living and true God—the Author of all things,—when compared with the idea of that Being entertained by the rude savage who "sees Him in the stars and hears Him in the wind!" And, then things being so, how amazingly does it magnify the importance of the work performed by every correct instructor and true director and stimulator of public and individual thought. The *true* teacher, the brave, able journalist, who exposes false theories and brings to light the moral and scientific truth of God, is really lifting humanity up to nobler conceptions of Deity and accomplishing a work that can only be matured by the length of eternity itself. Every lesson of sound science which the teacher imparts or the student acquires, and every intellectual energy which the student arouses or the teacher directs, supplies material and means out of which to construct a nobler idea of the God of the universe. How essential, then, is knowledge to the true idea of a Christian; so essential that the highest type of a Christian cannot exist without it. Paul said: "The invisible things of Him (Deity) are clearly seen, being understood by the things that are made, even His eternal power and God-head."

IS MAN'S INTELLECTUAL NATURE AN EVOLUTION FROM LOWER ANIMALS?

BY REV. JOSEPH S. VAN DYKE.

(*Concluded from last Month*).

Facts such as these come in strong conflict with the assertion of Hæckel, "All philologists who have made any progress in their science now unanimously agree that all human languages have developed slowly and by degrees from the simplest rudiments. The natural evolution of language is necessarily evident to the student of nature. For speech is a physiological function of the human organism, developing simultaneously from its special organs, the larynx and the tongue, and simultaneously with the functions of the brain."

When once the conviction has forced itself upon us that man's intellectual faculties must be the immediate creation of a Supreme Being, we are disposed to concede that his physical organism most probably had the same origin, since there is a correlation between the two. Man is not a duality, but a unity, all his organs being adapted to the purposes for which the mind employs them. If there are reasoning faculties so also there is a corresponding cranial development. If there exists the ability to invent new machinery, there is also a skillful hand to execute the mechanical part of the work. If there is a capability of receiving correct impressions of external objects, and reasoning in reference to their relations, there are also organs and senses adapted to convey accurate representations of these objects. Suppose that by some inexplicable fortuity the mind of Sir Isaac Newton had been given to a gorilla could that fortunate, or rather unfortunate specimen of the animal family have been the renowned philosopher? The very supposition is its own refutation, and for this simple reason, that the gorilla would have been destitute of the organs correlated to a mind so different from that of his ancestors. Its clumsy hand and unwieldy arm are indeed correlated to a brain whose servants they are, and are adapted to the uses for which they are needed: but no amount of brain-power could wield them in penning the "Principia." It's brain of 29¼ cubic inches (the average gorilla brain) or 35 cubic inches (the largest gorilla's brain yet measured) bears an inseparable relation to the mind that employs it, but would very poorly answer the purposes of a mind that employed a brain of 114 cubic inches. In like manner, the nervous system of the ape no doubt answers the ends for which it was given; but it does not follow that it would be equal to the demands of a philosopher. In fact it is certain it would not. So also the tongue, the lips and the larynx of the simiadæ are correlated with the functions they are to discharge, but are unfitted to pronounce articulate sounds expressive of definite ideas. In fact, as Professor Max Müller has aptly remarked, "There is between the whole animal kingdom on the one side, and man, even in the lowest state, on the other, a barrier which no animal has ever crossed, and that barrier is language" Again "Show me an animal that can think and say 'Two' and I should say, as far as language is concerned, we can not oppose Mr. Darwin's argument."

Nor is it pertinent to answer. This argument merely proves that mind must be the result of progressive development as well as the physical organism is, the two maintaining intimate and mutually helpful relations; for, aside from the fact that anatomists have resolutely maintained that in an anatomical point of view the transmutation of the ape into man is an impossibility, and aside from the difficulty of evolving man's mental and moral faculties from the simial family, an additional and very serious element of difficulty is introduced, namely, that the mental and physical improvement of the gorilla should go forward simultaneously, maintaining an accurate correlation during all the stages. Shall the budding of a new faculty, if indeed that is possible, first suggest the propriety of developing a new organ, or shall the incipient stages of a new organ invite the mind to prepare for expansion?—expansion in what direction? Or must the dawning of the two be strictly synchronous? In this case, whence comes the suggestive impulse? Surely we seem driven to admit the assertion of those evolutionists who affirm that progress is "by insensible gradations produced by a fortuitous concurrence of circumstances"—a wordy explanation, which explains nothing

Intelligence and instinct it has been said, stand in inverse ratio to each other. Some, accordingly, have maintained that higher animals have gradually evolved intellectual faculties from their instincts: but no such inverse ratio exists. Those animals have the most instinct which are the most intelligent, as the beaver, the dog, etc. This would seem to stand in the way of the assumption that instinct may be transformed into intellect, unless transformation can proceed without lessening that which is transformed until the transformation becomes nearly or quite complete, when suddenly intellect almost entirely displaces instinct. If, as is conceded, instinct becomes more powerful in animals in exact proportion as they become more intelligent, how, if man's intellect came from the lower animals, does instinct happen to be feeble in man though intellect is powerful? It is extremely difficult, as all know, to draw a line of demarkation between instinct and reason; but there certainly is no evidence that the former develops into the latter.

Mr. Herbert Spencer thinks that the dawnings of intelligence were developed "through the multiplication and co-ordination of reflex actions." This mysterious agency has been acting, however, upon baboons for unnumbered centuries under the eye of man. Have they made any perceptible progress in ability to reason? Have they attained that degree of intellectual development which enables them to understand what Spencer means by this all-potent law through whose operation their more honored relatives became, in ancient times—about four hundred million years ago—the anthropomorphous ancestors of Homo Sapiens?

Darwin says: "These (the intellectual) faculties are variable; and we have every reason to believe that the variations tend to be inherited. Therefore, if they were formerly of high importance to primeval man and to his ape-like progenitors, they would have been perfected or advanced through natural selection. . . . . It is, therefore, highly probable that with mankind the intellectual faculties have been gradually perfected through natural selection. . . . . It deserves notice that as soon as the progenitors of man became social (and this probably occurred at a very early period), the advancement of the intellectual faculties have been aided and modified in an important manner, of which we see only traces in the lower animals, namely, through the principle of imitation, together with reason and experience. Apes are much given to imitation, as are the lowest savages."

In this lengthy and interesting discussion of the

subject this last mentioned author undertakes to point out resemblances in structure between man and apes, similar processes of development, like functions of organic members, and even the possession by lower animals of the rudiments of almost every human faculty—sympathy, conscience, reason, will, memory, imagination, the sense of beauty, as exhibited in the Bower-bird, etc. The argument, shorn of its irrelevant though interesting facts, rests on the following syllogism:—1. Man's physical organism was probably developed from the lower animals, since they have correspondences; 2. His mental powers may possibly have been evolved from the germs which seem to exist in inferior animals, as in the ape family; 3. The two, as is necessary, may have been concurrently developed. Therefore, "Man is descended from a hairy quadruped, furnished with a tail and pointed ears, probably arborial in its habits, and an inhabitant of the Old World. This creature, if its whole structure had been examined by a naturalist, would have been classed among the quadrupeds, as surely as would the common and still more ancient progenitor of the Old and New World monkeys. The Quadrumana and all the higher mammals are probably derived from an ancient marsupial animal, and this through a long line of diversified forms, either from some reptile-like or some amphibian-like creature, and this again from some fish-like animal. In the dim obscurity of the past we can see that the early progenitors of all the Vertebrata must have been an aquatic animal, provided with brachiæ, with the two sexes united in the same individual, and with the most important organs of the body (such as the brain and heart) imperfectly developed." At the period and place, whenever and wherever it may have been, when man first lost his hairy covering, he probably inhabited a hot country; and this would have been favorable for a frugiferous diet, on which, judging from analogy, he subsisted. We are far from knowing how long ago it was when man first diverged from the Catarhine stock, but this may have occurred at an epoch as remote as the Eocene period; for the higher apes had diverged from the lower apes as early as the Upper Miocene period. "It is somewhat more probable that our early progenitors lived on the African continent than elsewhere." "The Simiadæ branched off into two great stems, the New World and the Old World monkeys; and from the latter, at a remote period, Man, the wonder and glory of the Universe, proceeded."

The above "summary" would probably be considered by most reasoners as a large yield of "conclusion" from a small outlay of premises (albeit, the discussion is sufficiently extended).

For fear we may be charged with doing injustice to this truly eminent author, who now rests in an honored grave, we append a few more of the interesting resemblances pointed out by him, as existing between man and apes—similarity in the relative positions of the features, similar movements of the muscles and skin in the display of emotions, resemblances in the external ears and nose, the possession of beards, the abundance of hair on the head, nakedness of the forehead, the presence of eye-brows, the arrangement of the hair on the arms in converging lines towards the elbow, the same senses and intuitions, the same emotions and faculties which though varying in degree are the same in kind, capability of improvement, etc. Though it would be unfair to leave the impression that Darwin considers these and similar resemblances necessarily the results of unbroken inheritance, and equally unfair to assume that he rests his argument mainly on these; it nevertheless cannot be denied that he lays great stress on slight analogies—much greater, apparently, than is warrantable. Such resemblances neither justify us in charging the Deity with want of originality, nor in inferring that those organisms in which they occur must stand related to each other as progenitor and offspring, or must have descended from a common ancestry. It is extremely difficult to conceive that there should have been an entire abscence of resemblances between man and the lower animals, if he was to possess a physical nature: apparently there was no necessity for entire dissimilarity; nay, the very similarity of organs in two beings which are nevertheless separated from each other by an "almost infinite divergence" tends rather to heighten the conviction that at least the faculties of the higher, if not those of the lower, must be the direct creation of divine intelligence.

In contrast with this theory—which is in fact but an hypothesis searching for facts upon which to rest—how honorable is the Scriptural account of man's origin.

Man's existence is due to divine power, his continuance in being to Him who upholds systems, worlds, suns, myriads of forces; to Him who cares for the minutest insect that flutters away its brief life in the morning sunbeam; who, to extremely tiny creatures, has given not only limbs, mouths, digestive organs—all the parts requisite to success in the struggle for food—but has even given an eye so perfect, though no larger than the point of a needle, as to be capable of producing forty thousand images of the face of the beholder.

"Marvelous are thy works, O Lord." In the list of wonders infinite, stand these the foremost; "God created Man:" He prevents him from sinking back again into annihilation.

If Man is an evolution from the anthropoid apes, at what point in his gradual, and almost infinitely protracted, improvement, did he become possessed of immortality?—or are we to conclude that, like the brute, he perishes? At what point did he become distinguishable as Man, beastialty giving place to humanity?

THE RECIPROCAL INFLUENCE OF THE MIND AND THE BODY.

BY J. W. LOWBER, M.A., Ph.D.

We have spoken of the mind's influence upon the body, and now wish to say a few words about the influence of the body upon the mind. God made man in His image. This applies to the body as well as to the mind. "So God created man in His own image: in the image of God created He him; male and female created He them" (Gen. 1:27). There is nothing else in the universe so much like God as is man. Christ did not take the nature of angels, but He became a descendant of Abraham. The time will come when the saints will judge angels. The body of man was made out of material previously created. Nearly every nation has a tradition that its first inhabitants sprang from the soil. The Greeks called themselves antochthones, from a belief that they were born on the soil of the land they inhabited.

In Gen. 2, which is but an amplification of the first chapter, we learn that man is a compound being, consisting of body and spirit (Gen. 2:7). We learn from analysis that the body is composed of sixteen material elements, eight of which are metallic, and eight non-metallic. The metallic

are aluminum, calcium, copper, magnesium, manganese, potassium, sodium, and iron; and the nonmetallic are carbon, nitrogen, oxygen, hydrogen, chlorine, phosphorus, sulphur, and silicium. Traces of a few others have lately been discovered. This was the most perfect piece of machinery ever made. It was not, however, until God breathed into it the breath of lives that man became a living being. The Hebrew word for life, in Gen. 2:7, is hăyyiym, from the verb hăyăy, to live; it is in the plural number, and should be translated lives instead of life. This takes a prop from under the edifice of materialism.

The body is the house in which the mind dwells. When the house wears out, or is destroyed, the inhabitant must necessarily leave it. Any injury to the house will for a time affect its dweller. It is not difficult to understand why a vigorous mind requires for its home a strong body. The mind intimately sympathizes with every change in the body. The condition of the stomach and the action of the heart affect the attention, the comprehension, and the memory of the mind. A change in the structure and functions of the brain induces insanity which, indeed, is a very helpless and deplorable condition.

From the wonderful influence of the body upon the mind, the following arguments have been deduced in favor of materialism: 1. That we know the mind only as connected with a material organism. The activities and phenomena of the mind are exerted through the body, and we only know the mind as connected with a material structure. 2. The powers and capacities of the mind are developed along with those of the body. As the lower organs of the body are the first developed, so the lower powers of the mind are the first unfolded. 3. All our knowledge, chronologically, comes from sensation; so the mind is dependent upon the body for much of its knowledge and many of its enjoyments. 4. Our first acquired ideas all have reference to sensible objects. From these facts the materialist concludes that the mind is only the culmination of a series of material existences.

We cannot accept the conclusion of the materialist for the following reasons: 1. The phenomena of the mind are in kind unlike the phenomena of the body. Extension and impenetrability are the essential properties of matter; while thought, feeling, and volition are the essential attributes and characteristics of the mind 2. While our knowledge is chronologically developed by sensation, there are primary principles which logically exist in the mind previous to this development. The Aristotelian maxim, *Nihil in intellectu, quod non prius in sensu*, is a pernicious maxim. There are some things in the intellect not in sensation; for there are ideas and emotions derived from man's moral nature. 3. The mind is self-active. Matter is inert, and the mind is impelled to action by its own energy. It also distinguishes itself from the material organization with which it is connected. 4. The mind is not dependent upon the body in its highest activities. When we see a landscape, and imagine we see another, the second landscape is independent of sensation. It is impossible to trace desire, hope and fear to a material origin.

Lancaster, Ky.

A ROMANCE LECTURE.

BY REV. L. W. BATES, D.D.

Mr. Editor: Some one has been kind enough to send me "The Scientific Man," containing a lecture delivered in Hulme Town Hall, Manchester, by George J. Romanes, M.A., F.L.S.

The subject of the lecture is

"ANIMAL INTELLIGENCE,"

and is an attempted explanation of animal instincts in harmony with the evolution theory, and some of the attempts are "infinitely amusing."

WASPS.

He says, "We have a somewhat mysterious instinct manifested by several species of wasp-like insects. These insects lay up a store of spiders to serve as food for their larvæ when the latter leave the egg. To do this, they sting the spiders in a certain spot of the body where there is a large nerve-centre—the effect being that the spider is not killed outright, but merely paralyzed, and so does not decompose during its imprisonment. How did the wasps first find out the precise spot in the spider's body where their sting would have this peculiar effect? We do not know. In this particular case it is, I think, possible that, if the facts were carefully observed, it would be seen that the form of the wasp happens to be so adapted to the form of the spider that the sting naturally strikes the nerve-centre of the latter; and, if this were the case, the origin of the instinct would be explained by the mere coincidence in the form of the two animals."

But whence the "coincidence of the form of the two animals," and the adaptation of the sting to merely paralyze and not kill the spider? Would not "natural selection" upon the part of the wasp for both itself and the spider, and the "survival of the fittest" by the spider, to be merely paralyzed and not killed, be a better explanation?

THE PARTRIDGE.

"By the effects of habit in successive generations, actions which were originally intelligent may become, as it were, stereotyped into permanent instincts. Thus, for instance, there are several kinds of birds, such as partridges and plovers, which have the wonderful instinct of pretending to be wounded when frightened off their nest by an enemy. Now this, I think, must originally have been an intelligent action on the part of those birds, the natural feeling being so strong, that when an enemy appeared there was an irresistible desire on the part of the mother to sacrifice herself rather than her brood; and so, instead of flying off, inducing the enemy to follow her away from the brood by pretending inability to fly. Those parents which had sense enough to adopt this devise would no doubt rear a greater number of broods than could the more stupid parents, and the young of such intelligent parents would inherit a tendency to adopt this device when they became mothers. Thus the originally intelligent device would slowly become organized into an instinct, and so is now performed with mechanical promptitude by every individual partridge or plover."

But why is this peculiar to birds that make their nests on the ground? One would suppose that a bird that had intelligence enough to protect its young by pretending to be wounded would have intelligence enough to build its nest in a tree. Are the maternal feelings stronger in these birds than in others? It certainly is not "an irresistible desire on the part of the mother to sacrifice herself rather than her brood," for when hard pressed she flies away and leaves her brood a prey to the enemy. The lecturer says, first, intelligence,

then instinct, and then mechanical. That is emphatically a "*descent.*"

The lecturer says he *thinks* that is an explanation. That God inclined those birds to build their nests on the ground, and gave them the instinct to allure the enemy from them, some of us think is a plainer and more satisfactory explanation.

INCUBATION.

"It is quite inconceivable that any animal can ever have kept its eggs warm with the intelligent purpose of developing their contents; so we can only suppose that the incubating instinct began in some such form as we now see it in the spider, where the object of the process is protection, as distinguished from the imparting of heat. But incidental to such protection is the imparting of heat, and as animals gradually became warm-blooded no doubt this latter function became of more and more importance to incubation; consequently, those individuals which most constantly cuddled their eggs would develop most progeny, and so the incubating instinct would be developed by natural selection, without there ever having been any intelligence in the matter."

But how were eggs hatched before these animals became warm-blooded? Were they hatched by the heat of the sun, like those of the alligator and ostrich? Why is it that the ostrich did not learn the incubating instinct and sit upon its eggs through the day as well as through the night—if it does sit upon the eggs at night? The ostrich and alligator are said to keep diligent watch over their eggs; why should not this desire to protect their nests develop into the incubating instinct as well as in the case of the goose or plover? If the mere protection of the nest developed with the incubating instinct, one would suppose it would also have developed in the partridge and plover the instinct to build their nests in a high tree with thick branches. Were all animals originally cool-blooded, and did their eggs need no heat in the process of hatching? The lecturer assumes the affirmative of both these questions, but does not offer a single argument in proof.

SUCKING INSTINCT.

Our lecturer says, "that it is evident that some instinctive actions are performed by animals at an age before intelligence has begun to exert itself. Thus, for instance, the sucking instinct can never have depended on intelligence for its beginnings. Therefore, it may be set down as the result of natural selections, and the survival of the fittest."

But how were the first young mammals nourished previous to the possibility of natural selection or the survival of the fittest? Mr. Romanes has evidently never met with that "first chicken" in the "Problem of Human Life."

LANGUAGE.

On this subject our author says:

"As man is the only animal which presents in any high degree the faculty of communicating by words or signs, we cannot be surprised that he should be the only animal which presents in any high degree the faculty of rational thought. Hence the only question which arises is, Why should man be the only animal that has developed the faculty of communicating by signs? Does the act of language presuppose for its exercise an order of mind totally different in nature from that of the lower animals? Or is it not the presence of this gradually developing art a sufficient explanation of the ever-increasing superiority of the human mind over that of the lower animals? In other words, is the art of language to be considered as the cause or as the effect of this superiority?"

He then proceeds to discuss it as the cause of this superiority; but is silent in regard to its being the effect of this superiority.

Mr. *Romance*, or rather Romanes, seems to have no difficulty in giving an explanation of any and everything presented. He can make intelligence produce instinct, and instinct mechanical habit; or he can dispense with intelligence and begin with instinct itself, and proceed to mechanical habit; or he can begin with mechanical habit and produce therefrom instinct at pleasure. He can sweep away the most insurmountable difficulties by a single stroke of his "I think," and settle the matter to his entire satisfaction. But his lecture reads more like involution than evolution.

ELECTRICITY THE MOTOR POWER OF THE SOLAR SYSTEM.—NO. V.

BY B. T. KAVANAUGH, M.D., D.D.

THE SUN THE SOURCE OF POSITIVE ELECTRICITY.

In former articles I have attempted to set forth, by a plain and natural method: 1, that the earth is polarized; 2, that the whole earth is consequently magnetized, and that this magnetism is peculiar to its own constitution; 3, that its revolution on its axis is produced and maintained by the attractive and repulsive force of the electric current proceeding from the sun and passing around it; 4, that this electric current holds the poles of the earth at right angles with itself; 5, that the polarity of the earth causes the interchange of ocean currents, and necessitates the elliptic form of the earth's orbit, and the inclination of its plane; 6, and that by electric forces the earth is propelled forward in its orbit.

In my last article I accounted for the ebbs and flows of the tides by the attraction and repulsion produced by the electric action of the moon upon the waters of the earth.

I have adopted this order in developing my theory, as it sets forth the progressive steps made in the investigation of the subject for nearly a half century, and hence it is the most familiar and natural mode that I could adopt.

It would have been more systematic to have begun with the sun, and to have followed the operation of causes to their legitimate result; but, for the reasons stated, I have begun with the facts and forces discovered in Nature, and the reasoning has been to find an adequate cause for their existence and the chain of consequences running through the whole system has led me to the consideration of the SUN as the centre and source of the great motor power which exerts a controlling influence over the revolutions and motions of all the planetary bodies.

For the data relied upon in the following, I am largely indebted to the *American Encyclopedia.*

FIRST.—THE MAGNITUDE OF THE SUN.

The authorities pretty generally agree that the sun's diameter is 853,000 miles, while that of the earth is but a little less than 8,000. The sun is, therefore, 1,253,000 times larger than the earth. Again, if all the planets of our solar system were consolidated into one body, still the sun would be 750 times larger than the whole. The magnitude of the sun is, therefore, ample for the offices assigned it, provided that it is otherwise properly endowed.

SECOND.—THE COMPOSITION OR STRUCTURE OF THE SUN.

What is its structure? Is it a solid body like the earth? By no means; for if this were its character it could only reflect and not emit light; and, as it has no near neighbors from whom to borrow it, we should, upon this supposition, be in worse than total darkness.

Not to stop here to consider the many false theories that have been presented to the world on this subject, many of which are simply ridiculous, we proceed to show what the sun must be, if, by its great Creator, its office was to be the receiver and dispenser of light, heat, and electricity; and, if we then show that this is its office, our position will be sustained.

The sun alone is the source of *positive* electricity —negative electricity resides with earth and other planets. Positive electricity does not penetrate solid bodies, but rests alone upon the surface of such; but positive electricity does enter into the body of the sun, as we shall presently see, and, therefore, the sun can not be a solid body.

Recent writers have shown that while the volume of the sun is 1,253,000 times greater than the earth, yet in material substance it is only 316,000 times greater; and, therefore, it must consist of a light structure, very porous and vascular, admitting of a free circulation of the elements necessary to the outflowing and emission of the fluids which are thrown off from its surface.

This view of the subject is greatly strengthened by the fact that recent observations disclose that the "spots on the sun" are extensive caverns, or wide, deep apertures, reaching far down into the central regions of the solar body. As long ago as the days of Sir William Herschel he found one of these "spots" to be a vast vortex, measuring 50,000 miles across the mouth. More recent observations, both in Europe and in America, fully confirm those of Sir William Herschel.

From the days of Galileo to the present time these spots have been observed, and no one seems to have undertaken to give a reason why they were so arranged, or for what purpose they were created.

THIRD.—THE SUN'S RESOURCES AND EXPENDITURES.

That the sun is issuing from its treasury, daily and hourly, vast floods of light, heat, and electricity is known to all men; but as to what the resources of the sun may be in keeping up this expenditure is not so well known.

A distressed astronomer of the old school recently promulgated the idea that the sun was fast consuming itself, as it had lost one-third of its former size, and it was now so scarce of material to keep up its flame it was gathering up the fragments of scattered meteoric stones and metals for the manufacture of light and heat for the universe! Are such fears to be indulged, or such philosophy to be tolerated? What are the facts? From what source does the sun receive its stores to compensate it for the very liberal supplies of light, heat, and electricity lavished upon its family of planets? To these questions, the electric theory returns the only satisfactory and rational answer. It is this: The sun originates nothing; it creates nothing; it consumes nothing; it is placed in the heavens as a great factor to receive and dispense the boundless floods of electricity with which God has filled universal space. Electricity exists in two states or forms—the static or quiescent inactive condition, and in the dynamic or active form or condition. That which has entered the sun's bosom in the static condition is quickened into the dynamic form and sent off by repulsion to perform its office on the distant planets; but the static supply surrounds the sun in infinite quantities, ever ready to obey the demands of the great central orb.

But the question may be asked, How can the outside supply enter the body of the sun, which is constantly sending off, in great force, from all parts of its surface, a flood of flowing light and heat? It could not enter at all if all parts of the sun's surface emitted such flame; but this is not the case.

We have just seen above that the sun is provided with a vast number of open mouths or deep caverns, some of which measure thousands of miles in diameter, from which nothing is emitted. These caverns are doubtless possessed of a great attractive force for static electricity, which is drawn in, to any necessary extent, to keep up a supply equal to the expenditures or emission proceeding from the flaming surface. Thus we find the physical structure of the sun precisely adapted to the office it was designed to perform; namely, to receive and dispense light, heat, and electricity throughout the solar system.

This subject will be continued in my next.

MT. STERLING, KY.,

UNIVERSALISM AGAINST ITSELF.

Last month we promised our readers an extract from this book as a specimen of the author's style of exegesis and biblical criticism. The following paragraphs contain his examination of one of the forty-four leading proof-texts claimed in support of the doctrine, all of which are handled in like manner in the first chapter of this work:

"*And in thy seed shall all the nations of the earth be blessed.*"—*Gen.* 28:18.

1. This is one of the most important proof-texts of the Scriptures supposed to favor Universalism, and is perhaps oftener quoted by the advocates of that doctrine than any other. But in quoting it and relying upon it as applicable to the future life, and as favoring the final holiness and happiness of the entire human race, Universalists are forced into various admissions, expressed and implied, that are fatal to their favorite doctrine. The assumption, for example, that promises of a universal or general character are *absolute* or *unconditional* is one of the very foundation pillars of the temple of Universalism; and if this single assumption can be proved to be fallacious and clearly contrary to the Scripture a large portion of the testimony heretofore relied upon is proved not only to be of no avail, but is absolutely opposed to the doctrine. We will therefore give special attention to this text as covering that branch of Scripture evidence relating to God's promises concerning man; and in such exegesis we will endeavor to show that this class of texts furnishes no evidence whatever in favor of the ultimate holiness and happiness of all mankind.

2. The force of the argument depends entirely upon the meaning and application of the word *shall*:—"In thy seed *shall* all the nations of the earth be blessed." Universalists are forced to assume that the promise is unconditional, or in no wise dependent on conditions to be performed by man, or otherwise the text is of no use to the doctrine. They assume this because no condition is expressed. But we will now undertake to prove

that many of the promises and threatenings of the Bible are conditional, and depend upon the actions of men for their accomplishment; even when the condition *is not expressed*, but merely implied. But previous to this, we lay down an important rule of interpretation, without which no man can shield the Bible from numerous contradictions, and from an ignorance of which have originated nearly all the false doctrines in Christendom; and many (especially among the Universalists) from not understanding this *rule*, have turned avowed infidels, and denied in toto the Divine authenticity of the Bible. The rule is this: *That a condition being expressed in any part of the Bible with respect to any promise or threat, that condition must be understood as implied, in all other places where that promise or threat is recorded, if not there expressed!* With this *rule* before us we will now examine some of the threats and promises of the Bible.

3. "And Jonah began to enter into the city a day's journey, and he cried and said: yet forty days, and Ninevah *shall* be overthrown," (Jonah iii: 4.) *Here* there is no condition expressed. It is not said: "Yet forty days and Ninevah shall be overthrown," *if* the people do not repent. But did not the Ninevites so understand it? Read the next verse: "So the people of Ninevah *believed God*, and proclaimed a fast, and put on sackcloth, from the greatest of them even to the least of them." Now if the people of Ninevah *believed God*, as it is here declared, why did they repent in sackcloth, unless they understood that there was a condition implied in this threat, and that they might by repentance avert the threatened judgment? Why did they not coolly submit to their fate,—await the forty days, and be destroyed, without exerting themselves in the manner they did? The response of all must be: it was because they understood that there was a condition *implied* in that threat. But was their understanding of the matter correct? Read on. "And God saw their works, that they turned from their evil way, and God repented of the evil *he said he would do* unto them, *and he did it not.*" (verse 10.) Now Universalists have to take one of three grounds: Either (1.) That God told the Ninevites a falsehood; or (2.) That the Ninevites were actually destroyed in forty days, and thus flatly contradict the record; or (3.) That there was a condition implied in the threat. The former two they will not assert; hence the latter they are compelled to admit, which lays the axe at the very root of their chief assumption.

4. "Wherefore the Lord God of Israel saith: I said indeed that thy house, and the house of thy father should walk before me forever [no condition expressed here]; but now the Lord saith: be it far from me [to perform this promise], for them that honor me I will honor, and they that despise me shall be lightly esteemed," (1 Samuel ii: 30.) Thus, notwithstanding God had promised, without expressing any condition, that the house of Ely, and the house of his father should walk before him forever; but because they refused to honor Him, by the contempt with which they had treated His ordinances, and thus did not perform the condition *implied* in this promise;—therefore the Lord reversed the matter, and instead of continuing to confer upon them the honorary distinctions of sacerdotal dignity, brought upon them shame and confusion of face.

5. "Then said David: O Lord God of Israel, thy servant hath certainly heard that Saul seeketh to come to Keilah to destroy the city for my sake. Will the men of Keilah deliver me up into his hand? will Saul come down, as thy servant hath heard? O Lord God of Israel I beseech thee, tell thy servant. And the Lord said: *he will come down.* [No condition expressed] Then said David: will the men of Keilah deliver me and my men into the hand of Saul? And the Lord said: *they will deliver thee up.* [No *if* in the case expressed.] Then David and his men, which were about six hundred, arose and departed out of Keilah,—and it was told Saul that David was escaped from Keilah, and *he forbare to go forth*," (1 Sam. xxiii: 10–13.) Here, again, we have Universalists in a dilemma. According to their doctrine, either Saul did come down, and the men of Keilah *did* deliver David and his men into the hand of Saul—because there was no condition expressed—or the Bible is false, and David was killed by Saul in Keilah, notwithstanding he reigned King over Israel many years after Saul was dead! When God said, in reply to the requests of David. Saul *will come down*, and the men of Keilah will *deliver thee up*; it was implied, *if* you continue in the city. This, the sequel proves; for David left the city—and consequently Saul did not come down, neither was David delivered into his hands. Universalists are compelled to acknowledge our position, or deny the truth of the Bible.

6. We have another most striking evidence of the conditionality of divine promises when the condition is only implied; and that, too, in the case of Abraham. We can thus let one promise to Abraham explain another. To this, none should object. "And he said unto Abraham: know of a surety that thy seed shall be a stranger in a land that is not theirs, and shall serve them, and they shall afflict them four hundred years,—but in the fourth generation they *shall* come hither again. (Gen. xv:13-16.) This promise is without an expressed condition; and has just as much appearance of *absoluteness* as the one under examination upon which Universalism is based. I can fancy I I hear the Jews, as they were traveling through the wilderness,—those disobedient fellows who were tinctured with Universalism,—debating with Moses and Aaron, and reasoning something on this wise: "Surely we shall be brought safely into the land of Canaan without the loss of one. This is as sure, and as firm, as the pillars of heaven. For God swear to our father Abraham, that after his seed had sojourned in the land of Egypt 400 years, they should be brought again into this land; and and there was no *if* in the case:—hence, it is unconditional. 'In the fourth generation they *shall come hither again*, and who dares to call in question the oath of Jehovah? Therefore ye men of Israel, although it would be better to walk in the commandments of God, yet you need have no fears with reference to that goodly land: the oath of Jehovah cannot be broken; and though you lie, steal, commit fornication, and bow down to other gods, and worship graven images made with your own hands: still you are perfectly safe, so far as the land of Canaan is concerned; for *that* depends alone upon the unconditional promise to Abraham. God, you recollect, confirmed the same thing to us when we were eating the passover; 'It shall come to pass, when ye be come to the land which the Lord *will give you, according as he has promised,*' (Ex. xii: 25.) What need we of further witness? God says He *will* give us the land of Canaan, according as He has *promised*. No condition here, either: hence, it will be certainly ours; notwithstanding these orthodox leaders—Moses and Aaron—are continually limiting the Holy One of

Israel, and teaching the absurd dogma, that our finite offences may frustrate the purpose of an *infinite* God, and that, on account of our sins, we shall die in the wilderness, and fail to reach the promised land," &c., &c.

7. This kind of reasoning in the abstract, has some appearance of plausibility we confess; yet the Lord has replied to all such logic, and the difficulty, we think, is satisfactorily disposed of. Let us now hear what He says: "As truly as I live saith the Lord;—your carcasses shall fall in the wilderness, and all that were numbered of you, according to your whole number, from twenty years old and upwards, which have murmured against me, doubtless *ye shall not come into the land* concerning which I *swear to make you dwell therein*, save Caleb the son of Jephunneh, and Joshua the son of Nun. After the number of the days in which ye searched the land, even forty days, each day for a year shall you bear your iniquities, even forty years, and ye shall know my *breach of promise*,—in this wilderness they shall be consumed, and *there they shall die*," (Num. xiv: 28-35.) This settles the controversy with Universalism, as based upon the assumption of absolute promises. Though God had made a promise to bring the posterity of Abraham into the land of Canaan, and had confirmed it with an oath, giving it all the appearance of *absoluteness* which can be attached to the proof-text under examination; yet, notwithstanding all this, the Jews by their unbelief and consequent disobedience, caused God to break that promise (or take advantage of the implied condition) and their carcasses fell in the wilderness; so Paul says: "They could not enter in, because of unbelief," (Heb. iii: 19.) It was not because God was unwilling to bring them in, but it was their own disobedience which caused the "*breach of promise.*" Had we no other proofs to offer upon this subject, the way the matter now stands, we would have the strongest probabilities in favor of our position, and against Universalism. This, however, is but a fraction of the evidence we have to offer.

8. "At what instant I shall speak concerning a nation, and concerning a kingdom, to build and to plant it; if it do evil in my sight, that it obey not my voice, then *I will repent of the good* wherewith *I said I would benefit them*," (Jer. xix: 9, 10.) Now, suppose we admit the text under examination, to be a promise of universal salvation as claimed, what would it avail Universalism, since God has most distinctly declared: "If they do evil in my sight, that they obey not my voice, *then will I repent of the good* [*universal salvation*] *wherewith I said I would benefit them.* Just as certain as God has promised salvation in heaven to men, just so certain they may forfeit this *good* wherewith God has said He would benefit them. The only way to meet this difficulty is to deny that God has ever promised salvation in heaven to any body (for we have seen that as certain as heaven is promised, so certain it may be forfeited by disobedience), and take the ground, that all will be saved by *chance!*

9. Once more: "When I say to the righteous that he *shall surely live* [this is expressed in language even stronger than the promise to Abraham], *if* he trust to his own righteousness, and commit iniquity, all his righteousness shall not be remembered; but for his iniquity that he hath committed, *he shall die for it.* Again, when I say to the wicked, *thou shalt surely die* [Universalists would say, this *surely* is unconditional], *if* he turn from his sin, and do that which is lawful and right,—he *shall surely live*, he *shall not die.*" (Ezek. xxx: 13-15.) There are two things in connection with this subject unaccountably strange. The first is, That the prophets should be so exceedingly particular in teaching principles the very opposite of Universalism. The second is, That the system of Universalism should ever have found a lodgement in the cranium of any man of intelligence, and be defended as if sanctioned by Scripture testimony. The testimony of the prophet, as above quoted, is most pointed and emphatic against this doctrine. Suppose Universalists should find a text, which declared in so many words: "the whole human family *shall surely be saved;*" still it would not prove Universalism, unless it could be demonstrated that the *whole human family*, without exception, would do that which is *lawful and right:* for we can turn over to Ezekiel, where the Lord has once for all, and forever put an end to controversy upon this subject, and where He has given us a clear, and most explicit explanation of all such promises. He there informs us, that though He should declare in language the most emphatic, that the *whole human family shall surely be saved;* yet if they should commit iniquity, and refuse to do that which is lawful and right, they *shall surely be damned*, they *shall not be saved!* From this we learn, that there *cannot* be such a thing as an *absolute* or *unconditional* promise, involving the happiness of man. God here informs us, that though He should make the most *positive* promise, without expressing or even intimating a condition, still there would be a condition *implied;* and it would depend upon the lawful and righteous conduct of men for its fulfillment! Sufficient has thus been said, we think, to dispose of Universalism as based upon the assumption of absolute promises in general. Yet it may be necessary to be a little more particular, and adduce a few more testimonies with respect to the promise at the head of this article.

10. Some deference at least should be paid to the views entertained by the *Apostles* concerning this promise. We shall first hear the opinion of Peter, as he was honored with the keys of the kingdom of heaven. In a very notable discourse, delivered by him in Solomon's porch, before a large audience of the Jews, he declares, "Ye are the children of the prophets, and of the covenant which God made with our fathers, saying unto Abraham, and in thy seed shall all the kindreds of the earth be blessed. [Unconditionally? No.] Unto you first, God having raised up his son Jesus, *sent him to bless you*, [How?] *in turning away* every one of you *from his iniquities*," [Acts iii: 25, 26.] Now, I have no objection to all men being saved, provided they all submit to be turned away from their iniquities. Peter here declares most positively that they cannot be blessed, according to the promise made to Abraham, unless Christ does turn them away from their iniquities. And this he is to do *here*, by his *first* mission. Mark the language: "God having raised up his son Jesus, *sent him to bless you;*" not *will send* Him to bless you at the resurrection! But did Peter tell them, in that discourse, what plan Christ had appointed, in order to turn them away from their iniquities? He certainly did. "*Repent* ye therefore and *be converted, that your sins may be blotted out*," [verse 19,] or, which is precisely the same, that you may be *turned away from your iniquities.* From this testimony it is incontrovertably established that the *blessing* promised in the seed of Abraham, is forgiveness of sins, to be enjoyed by "*all nations*" in this life, and is suspended upon the conditions of *repentance and conversion!*

11. We shall next hear Paul, the great apostle to the Gentiles. Universalists will certainly not object to his testimony. "When God made promise to Abraham, because he could swear by no greater, he swear by himself,—that by two immutable things, in which it was impossible for God to lie, *we might have strong consolation who have fled for refuge to lay hold on the hope set before us.*" [Heb. vi: 13, 18.] From this we discover, that the *consolation*, or the *blessing* included in the promise to Abraham, was for those only who *fled for refuge*, and who *laid hold* on the *hope* set before them in the gospel. Thus Paul's explanation of this promise, so far from favoring the theory of Universalism, leaves it stranded. But hear him, again: "The Scriptures forseeing that God would *justify* the heathen *through faith*, preached before the gospel unto Abraham, saying, in thee shall all nations be *blessed*," [Gal. iii: 8.] According to this, the *blessing* referred to in the promise to Abraham, was nothing more or less than *justification by faith*. If this be true, then two things must follow: 1. That the promise to Abraham is conditional. 2. That all who are not *of faith* have no share in the blessing promised. In order now to determine whether we have correctly understood the Apostle's view of this subject, we ask him this definite question: Who are to participate in the *blessing* promised to Abraham? He answers: "They which be *of faith*, are *blessed* with faithful Abraham," [verse 9.] In verse 29th, he adds: "If ye be Christ's, then are ye Abraham's seed and *heirs* according to the *promise*." Who are Christ's? Ans. "They that are Christ's have crucified the flesh with the affections and lusts," [Gal. v: 24.] Heirship *according to the promise* we discover from this to be conditional. None are heirs, except those who are children; for Paul says: "If *children*, then *heirs*," (Rom. viii: 17.) Let us now inquire if becoming *children of God*, and *children of Abraham*, is conditional; for, mark it, upon this is suspended *heirship*, "according to the *promise*." If we become children of God, and children of Abraham *conditionally;* then we become *heirs* according to the *promise, conditionally*, and consequently the *blessing* included in the *promise* to Abraham is not *absolute* or *unconditional*, as Universalists so confidently assert. Let us see. "We are all the *children of God, by faith* in Christ Jesus," (Gal. iii: 26.) "Know ye therefore, that they which are *of faith*, the same are the *children of Abraham*," (Gal. iii: 7.) The whole matter now stands thus; Paul's view of the subject being correct,: 1, We cannot be heirs, according to the promise made to Abraham, unless we belong to Christ the seed of Abraham; and we cannot be Christ's unless we crucify the flesh with the affections and lusts. 2, We cannot be heirs to the *blessing promised* to Abraham, the *unsearchable riches* of Christ, unless we are *children;* and none can be children, only those who "*are of faith;*" and hence the argument in favor of the *conditionality* of the *promise* to Abraham, is put beyond the reach of controversy. Peter's explanation, as we have seen, left Universalism dead; but Paul's leaves the doctrine *twice* dead, and plucked up by the roots!

12. In conclusion, upon this promise, we present *Universalism against itself*. Its advocates contend that *all nations*, must mean the *whole human family*, without exception. All we have to do now, to make Universalism stultify itself, is to read another text with its own definition. "When the son of man shall come in his glory, and all the holy angels with him, then shall he sit upon the throne of his glory, and before him shall be gathered *all nations* [that is, the entire posterity of Adam] and he shall separate them one from another, as a shepherd divideth his sheep from the goats," (Math. xxv: 31, 32.) Query: Was the whole human family arraigned before Titus at the destruction of Jerusalem? Were Universalists present on that occasion? If not, then the coming of the Lord is yet future; themselves being judges. We therefore speak within bounds, when we say that *Universalism* is virtually renounced by its advocates, whenever this text is summoned to its support.

A. WILFORD HALL, Ph.D.,

My dear Sir,—I have read with much interest the controversy between the MICROCOSM and Prof. Goodenow in regard to Newton's fundamental law of the decrease of the power of gravitation inversely as the square of the distance, the radius of the attracting body being the unit for determining this decrease; and it appears to me that the controversy may be condensed to a single consideration, and the law shown to be, as you claim, a pure scientific fallacy.

To illustrate, let us take the Sun as the attracting body. Its diameter is estimated to be 860,000 miles; its radius 430,000; this gives 219 radii from the sun to the earth. The square of 219 is 47,961; and the result of the computation shows that the power of the sun's attraction of the earth as compared with that at its surface, is as 1 to 47,961. Now, is it reasonable to suppose that this comparatively small power of attraction can overcome the centrifugal force of the earth, and hold the latter in its orbit? Yet, if Newton's law be correct, it must do so. But let us take, as a further illustration, the planet Neptune, and estimate the centripetal power the sun exerts on that planet, according to Newton's law. Neptune is stated to be 2,850,000,000 miles from the sun, and the number of radii from the sun to the planet is 6,628; this raised to the second power gives 49,930,384. The power of the sun's attraction of Neptune compared with that at his own surface is, therefore, as 1 to 49,930,384. The scientist who can believe that with this almost infinitesimal power the sun can hold Neptune in its orbit against the power of its projectile force, is the one who believes that a ray of violet light strikes the retina five hundred and ninty-nine million million times a second, as taught in all works on physical science, and that the prongs of a tuning fork, which travel in the aggregate seven inches a second, or at the rate of less than half a mile an hour, can throw off air waves which travel 1,120 feet a second, or at the rate of over 700 miles an hour, seven times as fast as the most violent cyclone that ever devastated the earth. He is, also, brother to that other eminent scientist who teaches that all the intelligence, knowledge, inventive powers and wisdom of man were concentrated "in the beginning," in the body of that moneron or other "simple being" from which he claims man is a lineal descendent.

It is unquestionably true that gravitation holds the planets in their orbits and binds the material universe together, but that its power decreases in accordance with the law laid down by Newton in his Principia, is, to say the least, highly improbable. It is evident that much of our science needs reconstruction; and the MICROCOSM, with yourself as its honored Editor, is nobly preparing the way for that reconstruction.

With much respect, I am yours very truly,

New York, Nov. 20, 1882. H. S. SCHELL.

THE SOUL AN ENTITY.

BY REV. F. HAMLIN.

It was evening in the Land of the Aztecs; that region of sunny skies, of fragrant flowers, of gleaming gold and shimmering silver. The sun's rays had already kissed the verdant hill tops, and trailed in beauty along the evening sky; when on a gory battle field lay Mexican and American, bleeding, groaning, dying; while among them, like a ministering angel, moved a Mexican woman, busily engaged in caring for the wounded of both armies. At last, as she bent over a dying man, a stray bullet pierced her heart, and she fell dead. Now, as in imagination we stand beside her cooling form, we ask, What brought this woman to the field of strife? You answer, "She was impelled by motive." But *what was moved?* Was it primarily her hand, or head, or heart? Was it anything physical, gross and material? No; the physical was but the instrument of that which was impelled, and wrought in obedience to its command. Surely the unreal cannot affect the *real.* A shadow could not bid a hand extend, or a foot hasten to the relief of the suffering. That which was moved was immaterial, invisible, and must have been an entity.

It would posit nothing against the entitative nature of the soul, if abstract reason or philosophy did not clearly reveal the fact. We should remember that in all inquiries concerning the intangible (and especially in psychological investigation), man is liable to be strongly influenced by imagination and vanity. We see this clearly illustrated in the writings of Tyndall, Helmholtz and Mayer on the wave-theory of sound, and in those of Newton, whose "yard stick" has recently been so hacked and scarred.

Thus was it with the few sages of Greece and Rome, who finding in the operations of the mind, no manifestation of the properties of matter, believed in soul immateriality, and argued from that not alone future immortality, but also a past eternity of existence. The truth is that while man in his present condition makes rapid strides in attaining a knowledge of the material and ponderable; when he enters the field of the intellectual he walks amid some mysteries which are unfathomable, and others of which he can learn but little. And when reason reaches its utmost limit in the examination and study of the unseen, she is prone to supplement her meagre accumulations of truth by drawing on the imaginary and unreal to fill out the picture.

And further, man must not confuse the unreasonable with the super-reasonable. That may be reasonable to Gabriel which to us is apparently unreasonable, because of our inability to grasp all the bearings of the case. To brand anything as erroneous which we cannot fathom, is arrogantly to declare ourselves the peers of Higher Orders of Intellect, and to ignore all mystery in the world. Worlds may exist though our insufficient vision may not behold them, and great truths may obtain though we are unable to comprehend them.

But we have indubitable philosophical demonstration of the substantial and entitative nature of the soul. The Editor of MICROCOSM has proved it in the statement, and amplification of a simple philosophical law namely, "That which moves an inert body must of necessity be a substance of some kind." On this self-evident proposition he rears a superstructure against which the waves of scepticism, and the lightnings of materialism may strike without danger of injuring the building.

In addition to this testimony of reason, *two facts throw a flood of light upon* this question of the soul as an entity or supernatural organism.

The first fact is this: It accords with the universal belief of men. Graves are adorned, not only by flowers and redolent plants (just emblems of the physical life of man, "which has been compared in Holy Scriptures to those fading beauties, whose roots being buried in dishonor rise in glory,") suggestive of the body's resurrection; but o'er the tombs of the departed even the heathen plant the holly, rosemary, or other *evergreen,* which, growing into luxuriance and overshadowing the tombstone, reveals human belief in the undying nature of the soul. If undying then at once immaterial, and an entity. And further, this universal impression is significant because of its very *universality.* As an effect is universal so must its cause be. This holds true of the sense of sin, of the instinctive disposition to appease Divine wrath, and also of the belief in the immortality, and therefore of the entitative nature of the soul. Now, that which as a cause is universal is omnipresent, and the omnipresent is the infinite, and the infinite is God, and God makes *truthful* impressions upon men. Therefore we are driven to a belief in the Soul's Entity, or a disbelief in Divine truthfulness.

The second fact worthy of notice is this. *Introspection teaches that the soul is a distinct entity.*

Somewhat moves my arm. It is not abstract power, for power is an *attribute;* and therefore while it may be a means, it never can be a cause. And if an attribute, it is an attribute of somewhat; and that somewhat must *be real,* for you can as soon conceive of a weight hanging on nothing, as of an attribute housing itself in a shadow. So that in which power resides is more than shadow; and if so, substantial, and entitative. Indeed we intuitively look for a cause in power dwelling in some substance. Leibnitz correctly taught that "the soul's power to act, proved it to be a substance"; and Gregory said, truthfully, "The soul must be immaterial and real; for it thinks, while matter does not."

The above considerations lead me to say that all materialistic objections to the view that the soul is a substantial independent organism, are fallacies.

We are told that that only is *real* which is visible, as if the ball were less an entity when flying so swiftly from the cannon's mouth that man cannot see it; or as if Christ is less an entity because the eyes of the Emmaus-bound disciples were holden that they might not see Him; or, as if odor is less substantial because it is invisible. Nor can we admit that the soul is (what Haeckel and Huxly teach) simply a force, form, or mode of motion. That the soul is forceful we admit, but a man's nature and his possessions are very different things. Indeed force is not a mode of motion, but a means of it. We must distinguish between cause and instrument. As well talk of the child producing the parent, or trembling of leaf producing wind, as of motion producing life. Life is that of which motion is not the author, but the sequence and characteristic. The soul is the parent, and not the offshoot of abstract force.

And this sublime truth of substantial soul-life sheds light on the otherwise mysterious problem of physical perfection in heaven. Dr. Lowber, in the October number of the MICROCOSM, speaking of the "reciprocal influence of the mind and body," notes not only how the reception of a sad message may affect *the healthy* when hungry—by instantly ridding them of all desire for food—but he also re-

fers to the recovery of an invalid, as a direct sequence of conversion. Have we not here a possible reason for the Bible statement that in heaven "there shall be no more death, neither sorrow nor crying, neither shall there be any more pain." Each entitative soul purified from all sin may become to its own body the eternal preventive of all physical maladies. If so, then with what new joy shall the *body-keeping* spirit sing, "O, death, where is thy sting? O, grave, where is thy victory? The sting of death is sin, the strength of sin is the law; but thanks be unto God who giveth us the victory through our Lord Jesus Christ."

However this may be, this remains true, Man stands to-day not shouting questions into (what Carlyle called) "the Sybil Cave of Destiny," and receiving no answer but an *echo*. Intuition, fact, and revelation shout back that the soul is an entity, destined to live forever. Mind, the Angel of the Universe, ready to soar out of the mists of earth, prunes her wings for everlasting flight. The instinct which forbids her to close her pinions and to die, has been voracious for time, and may be justly and safely trusted for eternity.

WHERE ARE HEAVEN AND HELL SITUATED?—PHILOSOPHICALLY CONSIDERED.

BY PROF. MELVILLE DOZIER.

EDITOR MICROCOSM :—Many valuable articles of a religio-scientific character are appearing in your journal from month to month, and your work cannot fail to revolutionize, in a great measure, many of the most commonly accepted theories in both science and religion. Of all subjects in which universal mankind should be deeply interested, heaven and hell should be accorded the first place; for, with few exceptions, every man believes himself surely tending toward one or the other, and believes, furthermore, that when once landed in either place he is there for eternity.

This universality of belief is of itself sufficient to demand attention to any theory, not in itself ridiculous or absurd, which may be presented in reference to either or both of these subjects

It is doubtless safe to assert, also, that there is no religious question about which there is more of the ethereal, the indefinite, and the purely imaginary, than about the questions "Where is Heaven?" and "Where is Hell?"

As a rule we speak of going *up* to heaven, and of going *down* to hell; but a moment's reflection will suffice to show that if these terms "up" and "down" be taken as indicative of direction, we are at once involved in self-contradiction and absurdity; for what is up to me is down to my antipodes, and will be down to myself in the brief space of twelve hours. Indeed, to no two persons on the face of the earth do the terms up and down refer to the same directions at the same time.

Manifestly, then, we must look elsewhere than to the mere idea of *direction* for the true and original import of terms so universally employed, as the term *up* in referring to heaven and *down* in referring to hell.

Nor do we look in vain for a satisfactory explanation of both the universality and the appropriateness of these terms. The derivation of the words heaven and hell is of itself a sufficient explanation.

As all scholars know, heaven implies that which is elevated, lifted or *heaved* up; nor is there any more common figure of language than that by which we speak of things that are noble, grand, glorious, pure, etc., as being elevated, high, lofty, etc. So, also, with the word hell. This word, in very similar forms, appears in nearly every ancient and modern language; and the meaning, in every instance, is a place of imprisonment, especially for the low, the degraded, the worthless, or the dead,—ideas always expressed by the word *down*, and words of similar import. It is, therefore, very evident that the universal conception of the *character* of heaven and hell, and not their *locality*, originally gave us these terms of reference. Yet, so prone are we to literal interpretations, especially in childhood when our ideas of heaven and hell are formed, that probably the great majority of the civilized world is thoughtlessly under the impression that heaven, to each man, is over his head and hell beneath his feet.

Now, while the Bible nowhere explicitly describes the locality of hell, does it not point out, beyond a reasonable doubt, the place of heaven; and, by multiplied references, enable us to frame at least a reasonable theory as to the situation of the former?

If the flood of light which "*The Problem of Human Life*" and the MICROCOSM have thrown upon the true nature of man's essential being proves anything, it certainly establishes the fact (which, in the light of the Bible, should have needed no confirmation) that man's future and eternal abode is of a substantial character.

The idea, then, that heaven is an ethereal something, located somewhere in space, separate and apart from all planetary and steller substance, cannot be entertained by any one who does not deny the plain teachings of God's word, and the indisputable proofs of the writings referred to.

We must, therefore, locate heaven either on our own globe, or on some other—equally real and substantial.

To do the latter would involve us in endless absurdities and entangle us in inexplicable difficulties from the very outset. We are, therefore, shut up to the theory that our own earth is to be our future heaven. And this, too, not only because it is the most reasonable theory, but the Bible teaches no truth more explicitly nor emphatically than that the Christ is to reign on the earth in actual person, subjugating all mankind to Himself, rooting up every trace of sin and the consequent evils that flow from it, and finally conquering and putting beneath His feet the last and greatest foe of man; namely, death. What physical changes in the face of the earth and its productions would be wrought by so wondrous a change in the administration of its civil and ecclesiastical affairs, can be better imagined than described. Certainly no mind could imagine a physical heaven more perfect in all of its appointments than would be this grand and lovely planet of ours, delivered from everything that tends to mar its beauty or to obstruct its productiveness.

But, great as would be the loveliness of this physical aspect of the regenerated earth, how much more heavenly would be the moral condition of society under "a perfect government, perfectly administered," over a perfect citizenship.

Indeed, what now prevents the earth from being a very heaven, save sin and its dreadful work?

This hydra-headed monster converted the paradise of God into a world of corruption, misery and death; and its thorough expurgation by the King of Israel will restore the sin-stricken denizens of this same globe to a state of life, joy, and incorruptibility, and the globe itself to the pristine beauty and glory which enveloped it when it left

the hand of its Creator. But if the earth is to be regenerated and made the everlasting abode of the righteous, what is to become of the wicked?

That the two classes cannot occupy the same territory is manifest; and, since the entire earth is to be subject to the wondrous changes to be instituted after the Master's return, and its entire population to be subject to His authority, it seems equally clear that no place on the earth will be left for the wicked.

Indeed, the Bible emphatically declares that the wicked shall be driven from the earth and from the presence of the Lord.

That the wicked will continue to exist after the judgment is denied by only an insignificant portion of the civilized world; nor will it be denied that the society of the damned, freed from every godly influence, would make a hell of any place. It will also be admitted that their place of abode must be a capacious one, and one, also, whose surroundings are in the highest degree disagreeable.

Where, then, can we, with any show of reason, imagine to be the destined home of the accursed?

Surely not in the interior of the earth; for every known and supposed fact respecting the nature of the earth's interior is antagonistic to this idea.

Neither can we, on other planets or in ethereal space, find a place for hell with any greater ease than for heaven.

Then, why not suppose it to be on the moon?

Although this supposition (for it pretends to be no more) may provoke a smile of ridicule, let us see if there are not some good reasons to be given in support of it.

First.—It is *away from the earth*, and yet connected with the earth in its orbital movement; and, indeed, according to the "Nebular Hypothesis," originally a part and parcel of the earth, cast off from its surface, as the wicked will be cast out of God's kingdom.

Secondly.—Between it and the earth "*a great gulf is fixed*," which may readily be supposed to be impassible by those who are sent there in exile. To this it may be objected that, if they can pass from the earth to the moon, why not from the moon to the earth again? But, surely, to be driven there by the will of the Almighty, in the fierceness of His wrath, and to be capable, of their own volition, to return, must be considered as widely different conditions.

Thirdly.—It is believed, on good scientific evidence, that the face of the moon which is turned towards the sun is subject to an intense degree of heat, while the opposite face is in a state of darkness, and experiences a degree of cold as intense as the heat of the lighted face. Now, man, from time immemorial has associated hell with either intense heat or intense cold, as is abundantly attested by history, mythology, and our own experience.

May not ideas so universal, both in point of time and of place, have been implanted by the Creator for wise purposes?

Why should terms expressive of intense heat be so frequently employed in holy writ in describing the tortures of the damned?

Some say that it is because such language, though purely figurative, conveys to our minds the most vivid conceptions of misery and of suffering.

This, certainly, is a plausible answer; but who will assert that it is the whole truth?

Fourthly.—It is reasonable to suppose that, as an element of their torture, the lost will be constantly reminded of the magnitude of their loss in missing the glories of heaven. Now, it does not require the mind of an astronomer to conceive of the grandeur of the earth as seen from the moon. It must indeed present an appearance which beggars all description. And what can more intensify the poignancy of our grief than to have the goal of our hopes constantly before our eyes, and yet hopelessly beyond our reach?

Fifthly.—The existence of the moon merely as a source of light seems to be inadequate to the grandeur of the scale on which it is created.

Neither as a source of life nor as a convenience to man or beast, does the amount of moonlight received by any portion of the earth appear to be a factor of any considerable importance in the economy of Nature. Is it unreasonable, then, to suppose that God fitted up this barren waste for other and more far-reaching purposes than merely as a feeble reflector of the sun's rays?

Lastly.—We believe the moon to be a lifeless world, and absolutely devoid of everything that could contribute to the comfort or the happiness of its inhabitants. What more appropriate place, in the universe of God, could be chosen for the abode of those who are doomed to the endless horrors of the "second death?"

The very orb itself is the embodiment and the type of death. What more fitting home for those over whom death must hold its dominion forever?

THE SPIRITUAL BODY

Editor of THE MICROCOSM.

The Bible recognizes the soul, even after it has passed out of the body, as a substantial entity. The Old Testament favors the idea that angels and departed saints have substance and shape, as real beings and are not empty shades. Many a spiritual creature has been seen by seers and prophets, and even by the common people; and if they were seen they must have had form. Even when Eliphaz says, "A spirit passed before my face," he seems to speak of a spirit having both voice and image. The servant of Elisha, whose eyes were opened, saw the mountain "full of horses and chariots of fire." Was this only an empty vision, or a heavenly reality?

When the angel of the Lord appeared to Manoah and his wife, to predict the birth of Samson, while they made a burnt offering upon a rock, the angel wrought "wondrously;" for when the flame went up toward heaven from off the altar, the angel ascended in the flame, and Manoah and his wife fell on their faces to the ground. What a glorious thing it would be to have a spiritual body which could ascend in a flame of fire, or soar on the wings of the wind, or fly as an arrow of light from world to world!

In that magnificent portrayal of the future life, contained in the fifteenth chapter of first Corinthians, St. Paul refers to the consummations and coronations of humanity. "There is," says he, "a spiritual body." "Flesh and blood cannot inherit the Kingdon of God." "Thou sowest not that body that shall be."

In II. Corinthians, fifth chapter, is something still more definite: "We know that if our earthly house of this tabernacle were dissolved we have a building of God, a house not made with hands, eternal in the heavens." The word "house," in the first part of the verse, undoubtedly refers to the mortal body; and it would be natural to believe that the same word, in the latter part of the same verse, also refers to a body, which he declares to be not made with hands; and this heavenly human body seems to be awaiting the soul to be conferred

at the moment of dissolution or death. For the Apostle immediately adds, "In this we groan, earnestly desiring to be clothed upon with our house which is from heaven;" and, "We are willing rather to be absent from the body, and to be present with the Lord."

The Apostle seemed to expect that he would receive his spiritual body as soon as his earthly body should be "dissolved," or as soon as mortality should be "swallowed up of life." Have we not, therefore, ground to hope that when these earthly houses topple down, and tumble into their graves, we shall be immediately "clothed upon with our house which is from heaven?" This makes heaven real; not vague, shadowy, and afar off.

"Only the sweet closing of an eye
Shall bring us there to be."

The Bible student will readily find other evidences of substance, embracing feature and form and all the powers of natural life, associated with the immortality of the soul. The Bible deals with facts, not fancies and phantoms.

T. M. GRIFFITH,
Pastor of the Methodist E. Church.
Tamaqua, Pa.

TRICHOTOMY.

BY REV. G. H. MCKNIGHT, D. D.

My second paper on this topic was to answer the question, Is the threefold or triune nature of man in accordance with true science and philosophy, as well as Scripture? I do not claim that the argument, either from Scripture or science, amounts to a mathematical demonstration; and I am not at all surprised, from letters received, that one from a Unitarian stand-point would upset all my conclusions from the words in the 1st chapter of Genesis: "Let us make man in our image after our likeness." But the argument for the Trinity is cumulative, and rests upon no one text or passage; and in view of this fact I think it may be fairly implied that the Three Persons of the Godhead took counsel as to the creation of man, the noblest part of all God's works. Again, it was not my intention to infer that man was threefold in his nature precisely in the same sense that God is triune. The only point I intended to make was, that inasmuch as God declared Himself as three and yet one, Trinity in Unity, not three Gods as one God, or three persons as one person, or the reverse, but as three persons and one God, so man is three and yet one—physical, intellectual and spiritual. It will not do to make either analogies or parables to go on "all fours." But this doctrine was only incidental, as I have said in my former paper. My object in that was to show that man is threefold in his nature according to the Scripture, not claiming that this was the philosophy or science there positively or formally taught, any more than that the science of geology or astronomy was there taught, but inferred from various passages. It is very common to hear it said that the "Bible is not a text book of science. Nevertheless there are statements and allusions to scientific matters which are wonderfully in accord with recent investigations, so marvellously indeed in harmony with these that it is a strong proof of the inspiration of the Scriptures. The infinite superiority, for example, of the Mosaic Cosmogony to all heathen Cosmogonies, and its wonderful harmony with geology in the successive creations, from the lowest to the highest, is a very strong proof of inspiration; in fact I assert without fear of contradiction by any man who has brains and knowledge enough to grapple with the subject, that there is no other way of accounting for this superiority except by conceding Divine Superintendence.

But to return to the subject under consideration. That several of the ancient philosophers hold the doctrine of the threefold division in man's composition, among whom was Plato, is well known; indeed, it has been said that St. Paul borrowed this doctrine from this philosopher. That St. Paul held the Platonic view, is very likely; but that he incorporated in his own teaching simply as a philosophical speculation or theory of Plato, cannot be admitted. St. Paul on a certain occasion at Athens quoted with approbation one of the heathen poets, and so he adopted the threefold view: not because Plato taught it, but because it was true.

But what does modern science teach? Physiology treats of man's physical nature, mental philosophy of his mind, moral science of his conscience or moral sense. Or, in other words, we have the physical, intellectual and moral distinctly recognized; and no other philosophy of man's nature is at all adequate to explain that nature. Even the materialist must recognize this division; though he claims that the intellect is identical with the brain and that thought is only a product of its gray matter, the result of a mechanical change of its molecules. Nevertheless, men like Tyndall, if not pronounced Materialists, yet totally skeptical as to man's immortality, are compelled to admit that matter has a spiritual side; that there is a certain invisible, mysterious force, a force which defies all analysis, which moves the brain to action. Now, we are ready to admit a most intimate relation and connection between the brain and the mind; indeed, without adopting all the conclusions of phrenology, we are free to concede that the size, texture, activity and conformation of this organ has a vast deal to do with the intellect. Furthermore, we may admit that different portions indicate different faculties and propensities; that the cerebrum and sensorium severally indicate reflection and reason, sensation and emotion. No modern writer has written more ably on this subject than Mr. Wm. B. Carpenter, in his work on "Mental Physiology." This author says that, "When the cerebrum is so imperfectly developed as to be greatly under the average size, there is a marked deficiency in intelligence amounting to absolute idiocy." But, again, he says: "It is necessary to consider whether cerebral changes are in themselves attended with consciousness, or whether we only become conscious of cerebral changes as states of ideation, emotion, etc., through the instrumentality of the sensorium?" Now, whether this is a correct analysis or not, so far as locating the intellect in the cerebrum and consciousness in the sensorium, it is absolutely certain that between the mind and the brain there is the most intimate connection, if not absolute identity. If the brain is injured or diseased in any way, the mind is affected. Not so with other portions of the body. You may amputate an arm or a leg, or both arms and legs, and yet the mind will remain sane and vigorous. Nay, the whole body may be paralyzed but the brain and the intellect remain intact. I saw a child this summer who, in an attack of spinal meningitis, was paralyzed all except the brain, and the intellect was as clear as ever.

Now, the common opinion is, that the brain is the organ of the mind (this is generally conceded), the machinery through which the mind acts. But is it not something more than this? Is not the

brain in some way identified with the pseucha, or animal soul? The brute has brain as well as man; he has intellect as well as man; and what intelligence he has is in the cerebrum, as well as in man, or in the frontal portion of the brain. And so I think it will be found that the most sagacious or intelligent brutes have the largest development of the cerebrum, while mere beasts of prey have a very slight development in this respect. That brutes have reason, the same kind of intelligence in fact that man has, can hardly be questioned. Says Sir Benjamin Brodie: "It would seem that it is in proportion which their instincts and intelligence bear to each other that the difference between the mind of man and that of other animals chiefly consists. Reasoning is not peculiar to the former, nor is instinct peculiar to the latter. Even insects, which are generally and properly regarded as being below the vertebrate animals, are not altogether deprived of that higher faculty which enables ourselves to apply the results of our experience to the new circumstances under which we are placed." In a recent work by Sir John Lubbock, a man who stands foremost among the naturalists of Europe, the position here taken in regard to the superiority of the vertebrate animals is wholly denied; for he claims that ants in intelligence come nearest to man, which, if true, would be a knock-down argument for the evolutionists who make the anthropoid ape the *connecting link* between man and the brute. But both of the high authorities here quoted ascribed reason to the lower animals, and in addition Dr. Abercrombie, in his "Mental Philosophy," says: "There are in the lower animals many phenomena of mind, and with regard to these we also contend that they are entirely distinct from anything we know of the properties of matter, which is all that we mean or can mean by being immaterial." Now, without entering into any discussion as to the difference of material and immaterial, or mind and matter, so far as the pseucha or animal soul is concerned, is it not plain if man and brute are alike in these respects, and man is simply dual in his nature, that we are driven either to the materialistic conclusion or to the immortality of brutes?

But now while we admit all than can be reasonably claimed for the brute species, yet man is infinitely his superior, not only in the fact that he has speech and language, but spiritual ideas, emotions and aspirations, capacities for apprehending God, and desires for an eternal existence in His presence, a glorious immortality. Man has, in short, a distinct spiritual nature, a pneuma which the brute has not. This, as Sir Francis Bacon says, "is that side of our nature which is in relation to the infinite. Of this relation, in whatever way we may describe it, which seems to constitute man's most distinctive peculiarity, and it is this which is the source of those notions of truth, goodness and beauty in the abstract, which seem peculiar to the higher types of humanity." Again, in harmony with the view advocated in this paper, Doctor Dawson, in his very able work on the "Origin of the World," says: "In the language of the Bible the merely vital endowments of the man belong to the flesh (σαρξ) and to the rational mind or soul (ψυχη). The higher nature which man derives directly from God is the spirit (πνευμα.) Either of these parts of the complex humanity is capable of life (ζωη) and of immortality." I suppose that no one will deny this, for God can confer immortality upon the brutes if He so please; and so if He please He can extinguish the spirit (πνευμα.) All life whether temporal or eternal, depends upon Him. At the same time there is a marked distinction, as Dr. Dawson admits, between the animal soul and spirit. Dr. Hall, in the "Problem of Life," has beautifully and forcibly illustrated by the wheel and magnetic armature, the independent existence of the soul. In his argument here he seems to recognize only the dual nature of man, yet the argument is just as forcible, nay, more so, if used in reference to the triune nature; for while the mysterious force which keeps the wheel revolving when objects intervene may be the pseucha, yet the force which evidently exists after the wheel is broken, because it instantly acts when it is repaired or made whole, is the spirit which exists independent of the brain or any material machinery. By a concussion of the brain, for example, unconsciousness is produced, and to all appearance the person is dead. The mind in this case as well as the body is without sense or motion. Is the spirit likewise insensible? We think not. We have indeed instances where the person has been to all intents and purposes dead, where all the faculties of mind and body were paralyzed, and yet where personality has been retained and the spirit has consciously existed out of the body, independent in fact of all its machinery. Such has been the experience related after restoration to the normal state.

I fear, however, that I am extending this paper to an undue length. In conclusion permit me to say, that I have by no means claimed that the evidence of man's threefold nature amounts to a demonstration. There are difficulties and mysteries in regard to this whole subject—difficulties that relate to mind and matter, material and immaterial, their union and separation, which no one can solve. This whole question involves metaphysical subtleties which perplex the wisest philosophers, and which I certainly should not pretend to explain, as Pascal says: "Man is to himself the most marvellous object in Nature; for he cannot conceive what body is, still less what is spirit, and less than all how body can be united to spirit." We can only, therefore, approximate to the truth. We can observe phenomena and adopt a theory best fitted to the facts. In view of the facts the triune view seems to me the most satisfactory, the best certainly with which to meet the Materialist, and to raise man above the mere animal. And as this seems also in harmony with Scripture, I hold it as the best theology, as well as the best science.

"KIND WORDS NEVER DIE."

[*The following are mere samples of hundreds of letters we are continually receiving.*—HALL & Co.]

Rev. E. O. Norville, La Prairie, Ill., writes:

"The gravitation controversy is becoming more than interesting. It is *exciting*. To see the greatest law and scientific demonstration of the greatest philosopher known to fame successfully attacked and broken down by an unheralded writer who has just come upon the stage of scientific discussion, is one of the grandest sights that the world has ever witnessed. Then, to see him, single handed, meeting and successfully combatting the objections of half a dozen able astronomers, who attempt in vain to defend Newton's law, adds to the intensity of the scene. Though error dies hard, there can be but one verdict, and that is, that Newton's greatest mathematical achievement is dead and buried beyond the hope of a resurrec-

tion. Three cheers for Wilford Hall and THE MICROCOSM."

Rev. A. MARTIN, Hollister, Cal., writes:

Hall & Co.,

"GENTS,—I send you my subscription for Vol. II. of THE MICROCOSM, with the money for fifteen other new subscribers. I have been reading the first volume consecutively, and I need hardly tell you that I am deeply interested in the questions discussed by the Editor, and his able corps of contributors. May God bless your enterprise, and extend the paper into every family. You are doing a grand work for the cause of both science and religion. I shall continue to get subscribers for both the paper and the '*Problem of Human Life*' as I have opportunity, and expect to send you another list in a few days."

Elder W. H. KERR, Waynestown, Ind., writes:

"I have read the '*Problem of Human Life*,' and I am at a loss to find words in which to express my admiration of the work. It meets a long-felt want, and will accomplish a work that the Bible alone could never do. It is certainly an inspiration; and, excepting the Bible, is to-day the best book in the world. It is unanimously conceded by all with whom I converse, to be the death-blow to Atheism, and the profoundest scientific work of this or any previous century. Not long since I attended a meeting where I met about twenty able ministers, and it was the opinion of all that the 'Problem' is to infidelity in all it phases, what '*Universalism Against Itself*' was to Universalism —a wound that can never be healed."

Rev. M. BARBER, Cazenovia, N. Y., writes:

"Inclosed find $1 for the second volume of THE MICROCOSM. I am glad you are going to put it in magazine form. I can never tell you how much I enjoy your paper, and how greatly I am helped by it. As a minister, I have come to regard you as one of my staunchest friends. You have cleared the way where I have thought for years there might be made an open path, if some one only knew how to cut it. My heart says, 'God bless you' every time I take up your paper. I wish it could go into every house in the land. Praying that your life and health may be precious in His sight, and that your new volume may find its way over all the earth, I remain, with kindest assurances,

Sincerely Yours, E. M. BARBER."

Rev. J. A. FERGUSON, Greenville, O., writes:

A. WILFORD HALL.

"The first number of volume 2 is received, and I am very much pleased with it. I am one of the 'ignorami' who read your book with both delight and profit, and I shall feel that I am doing a good work for the cause of God and benefitting my fellows, by giving as great a circulation as possible to the '*Problem*' and MICROCOSM."

THOS. W. BARTLETT, Carthage, Mo., writes:

MESSRS. HALL & CO.

"By a singular accident it was my good fortune to come into temporary possession of a copy of the '*Problem of Human Life.*' I devoured the book with the greed of a hungry wolf, and realized more pleasure and profit from it than from all the books I have read in twenty-five years. I mentioned the work to several of my friends with the result of four orders for book and MICROCOSM, for which please find $8 inclosed. Please send me circulars, with terms to agents."

Elder J. W. RICE, Editor *Christian Review*, Cincinnati, Ohio, writes:

"The October number of the THE MICROCOSM is an admirable one. Swander's review of the '*Problem*' is a masterpiece of composition. I have read it with profound respect for its author. He is evidently a rare scholar in the finished use of the English language, and he says things as happily as any man I ever read after. His article is a fair, and most impartial criticism."

Rev. M. DABNEY, Santa Rosa, Cal., writes:

A. WILFORD HALL.

"Your '*Problem of Human Life*' has received a most rapturous welcome on these Western shores, and your arguments are now used everywhere against the evolution doctrine. There are many whom Darwinism had silenced, though not convinced, and who, grieved and perplexed, have been unable to defend themselves against the assaults of modern scientists, but who now walk erect, thanking God that the beastly theory is at last overthrown, and that there was some one in the background able to cope with the hitherto invincible advocates of development. With your book well in hand, the weakest student of science may successfully meet and overthrow the giants of evolution."

Elder TRUMAN writes:

"DEAR BROTHER HALL. * * * * * When you began your attack upon Newton's demonstrations I trembled; *but my nerves are now quiet.* Our preachers in this country, so far as I know, take your side in the *Standard* controversy. I believe that God has raised you up for this work.

Your friend, O. H. TRUMAN,
Pastor of the Church of Christ, Redfield, Iowa."

Rev. G. A. MOFFAT, Mineral Springs, Ark. writes:

"My copy of the '*Problem of Human Life*' will soon be worn out, so many have read it, and so many more are still waiting their turn. I have kept it going so that I have not had time to read it as I had wished to. * * * * What troubles me is, that after twenty-five years of peaceable possession of the wave-theory of sound, as I was taught it in college, I now find it scattered by the breeze raised in the 'Problem' as if it were a pile of chaff. What I prided myself in as science, I now discover to be superlative nonsense. Though I have to begin anew, I am thankful to be relieved of these much prized absurdities. Thank God for raising up the author of that book to show us the better way."

Prof. R. G. YOUNG, Superintendent of City Schools, Newton, Iowa, writes:

"Sometime ago I purchased a copy of the '*Problem of Human Life*' and commenced reading it. I am still reading it, and to say that I am interested does not half express the truth. I am surprised that intelligent men have for centuries clung to such a ridiculous theory as the wave-theory of sound now is shown to be. I am satisfied that your arguments are unanswerable, and that you deserve the thanks of the scientific world for proposing such a simple, clear, reasonable, and com-

mon-sense theory in its stead. After my class, recently, had finished the chapter on sound, as taught in the text-books, I took occasion to explain some of the prominent features of the corpuscular hypothesis. The new departure was received by the class with such expressions as 'How simple!' 'How clear!' 'Well, now, that looks sensible!' 'Why can't we have that in our books in place of the old theory?' etc. I do really hope that the day may not be far distant when our text-books will be revised and these nonsensical theories discarded."

Rev. D. H. REITER, pastor of Reformed Church, Fulton, Mich., writes:

"I can wait no longer. Have already delayed beyond the time in sending my dollar for second volume of MICROCOSM. In its present form it is just what every lover of truth wants:—neat in appearance, clear in type, and sound in religious philosophy and true science. It is a magazine that must commend itself to the thinking thousands everywhere, irrespective of denominational lines."

HOW GOD CREATES—GRAVITY.

BY REV. PROF. S. WOOD.

God, the Creator, is the Supreme Intelligence—the Infinite Love and Wisdom—who is in all time without time, and in all space without space. He has no local habitation in space to which we might refer. His infinite substance is the Divine Love, and His infinite wisdom is the radiant impulses of the Divine Love.

With this infinite intelligence there can be neither fore-sight nor back-sight; neither fore-knowledge nor back-knowledge, in the finite sense of human understanding; but in-sight instead, and in-knowledge. His desire of creation could have had but one end—the ultimation of His love. In the process of creation, God works just as the sun works; indeed, it is God working through the sun which we see.

It is evident that the earth and all things upon it owe their origin to the sun, and that all the various forms and uses are the work of the sun through the atmosphere and other intervening media; therefore it is only necessary to learn how the sun works, to form a very clear concept of the manner in which creation proceeds. Creation is not a work that is done up and laid by; it is a work that is ever-progressive. God is creating now as ever.

If an intelligent person had never seen the laborers at work upon an engine, and desired to know how it was made, and had no opportunity of seeing the operators, he could obtain a very correct idea of the process by examining the tools, implements, forges, and other things to which he might have access. What we call the forces of Nature, are the implements that the sun uses in its creative work, It may be well to examine some of these forces. Not anything can exist unconnected with that which is prior. The planets could not exist unconnected with the sun. The whole solar system is joined together as one whole, acknowledging one common centre, the sun; and so interdependent are the parts, each to each and each to all, that the stability of the whole system is dependent upon each planet in the system. Each primary planet, including its satellites, if it have any, may also be considered a unit, or as one whole, of which each part acknowledges a common centre, and is dependent upon the whole, and the stability upon each part. The same may be predicated of each satellite, and of each unit existing in connection with either: *the less is an effigy of the greater*. One uniform law is manifested in the whole, and in each of its parts. This law is universal in reference to the whole system and particular in its least parts: it acts as a unit in reference to the whole, and also to each part. There are possibly as many solar systems in our galaxy as there are stars, and by this same law they are held together as one whole; and as this law regulates and sustains the planets in their revolutions within the solar system, so it regulates and sustains these solar systems in their fluxions within the grand system of our galaxy. There are possibly many such grand systems in the great universe, which, analogy would assure us, are governed by the same law.

Some physicists have supposed that this law of gravity is not universal, but operates only in our system; therefore, right here, I wish to fix the mind upon this sublime truth so necessary to any understanding of the process of creation. It is this: *Every law of Nature is universal;* its laws are co-equal and co-extensive with Nature. Whenever we discover a law of Nature, we may be sure that it is of universal application. The laws of Nature are really the Divine influx into Nature through discrete degrees. As this force called gravity is peculiar, and in many respects very different from any other known force in Nature, it may be well to notice some of its peculiarities as an aid to the solution of the problem before us.

1st. Gravity acts in time and space, practically without time and space.

2nd. There is no analogy between the action of gravity and the other known modes of physical action, except in its decrease "as the square of the distance."

3rd. The action of gravity is instantaneous, while radiant heat, light and electricity are propagated with a finite velocity.

4th. The action is entirely unsusceptible of interference by intervening obstacles.

5th. All bodies are absolutely transparent to it.

6th. Its direction is in right lines between the centres of the attracting masses, and it is not subject to reflection, refraction nor composition.

7th. It is incapable of exhaustion—every body attracting every other body by a definite law.

8th. It is wholly independent of the nature, volume and structure of the bodies between which it acts.

9th. It acts only upon matter as such, and not upon the active forces.

10th. Its energy is unchangeable, incessant and inexhaustible. (*See Modern Science, p.* 62.)

Now, the question that arises right here is one that seems never to have occurred to the physicists of modern times. It is this: Does gravity act by impact or from influx? All forces acting on the same plane (as physical things acting upon physical things of the same discrete degree) cause action by impact; but those forces that act from a higher plane, cause action by influx. It is well known that the will causes the mind to act and thoughts are produced, and through these thoughts voluntary action takes place in the body; thus the body is moved by the will. No well-informed person supposes that this force of the will causes action by impact, or is in any sense mechanical. It need not be supposed that this living force acts directly upon the muscles; there may be a connecting medium—a *nexus* partaking of the nature of both. Gravity is connected with Nature as a part, and is

therefore not a living force; but it is the first physical response to the terminating living forces. The creation is an efflux of the Divine Mind—the impulses of the Divine Love radiating and terminating in time and space through various degrees of descent until finited. No natural substance could exist until there was reaction, or reciprocal action, of the terminating entities. This response or reaction seems to belong to the thing itself, by which that thing acts as from itself. For instance: The sun acts spontaneously; "The earth bringeth forth fruit of herself, first the blade, then the ear, and then the full corn in the ear." Man acts in freedom as from himself; and, in his true order, loves his Creator with all his heart, and his neighbor as himself, which love he feels as his own, but it is really the Divine Love received by influx, and acting through Him. So in Nature. She has no life of her own, but responds to spiritual forces flowing in. In whatever form natural substance first existed, this force must have been the first to manifest itself; it is nearest the spiritual—a *nexus* possibly between the spiritual forces and dead matter—a connecting link partaking of both. This would account for its universality, its independence of time, its unsusceptibility of interference by intervening objects, its want of subjection to reflection, refraction or composition; and for the unchangeable, incessant and inexhaustible nature of its energy. Its subjection to the physical law of diminution of force "as the squares of distances," (?) connects it with Nature. The corresponding things in the mental world, which are subjects of our experience, support this view. As love holds all together and all to God, so gravity (by whatever name this force is recognized) holds all together in the same system, and all to the centre of that system.

SPECIMEN PRESS-NOTICE.

The following splendid volunteer notice of the "*Problem*" we clip from the *Wichita* (Kan.) *Eagle*, for which we thank the editor:

A BOOK FOR PREACHERS AND ATHEISTS.

The most wonderful book that has come under our notice, unquestionably, for years, is a work by Wilford Hall, of New York city, entitled the "*Problem of Human Life, Here and Hereafter*," in which the author undertakes and does prove by science and incontrovertible logic, that this life is not all there is of or for man, and that the personal God of Revelation is the God also of scientific truth. But before doing this noble work, a task that has been essayed by so many and accomplished satisfactorily by none, he demolishes the infidel theories of Darwin, Huxley, Hæckel and others with their own weapons, rendering evolution, spontaneous generation, and other philosophical theories of the kind childish and nonsensical. When we say it is a book for preachers and atheists, we mean that the one can gain scientific facts singly and in clusters with which to demolish the bravest and acutest infidels, while the other can step by its aid from the darkness of darkness into the marvelous light of a life beyond this. In the plainest and simplest of language the foundations of materialism are shattered and the great Goliahs of the "monkey theory" are left pitifully floundering in the slough of their own sophistries. No minister of to-day can afford to be without this book. The Rev. Drs. McCosh and Joseph Cook, who could not defend themselves against the champions of the "survival of the fittest" in such a manner as to be intelligible, can in this work find enough successfully to combat and put to rout all the evolution sophists that live. The author holds that the life and mental powers of all living creatures are demonstrably substantial entities, parts of an interior and invisible organism consisting of real substance and of which the outer or corporeal structure is but the tangible or visible counterpart. If one thinks Darwin's *pangenesis* helps to make a man out of a tadpole, or even out of a higher order of monkey, let him read "*The Problem of Human Life, Here and Hereafter.*" Darwin says the ovules of a horse and of a man differ in no respect, but this work proves that the same difference exists as between the man and the horse, and at the same time he comes very near proving Darwin to be a scientific ass. Elephants do not give birth to pigs, nor cows to kittens; no more did man's soul spring from an oyster, or his brain from a moneron. But more at some future time. The book is published by Hall & Co., 23 Park Row, New York, for $2. The publishers offer large discounts to agents.

PSYCHO-PHYSICAL ASSIMILATION.

Persons living together for a long time, on intimate terms, and under the influence of mutual affection, have been observed to gradually approach a mutual personal resemblance, so much so, that strangers have often detected (or fancied they did) a family resemblance. And the question, What is the cause of this mutual assimilation of countenance, this "changing into the same image," of those who are daily looking into each other's countenance? has perhaps been oftener asked than answered.

Does not the question find a ready solution in the position taken in the "Problem of Human Life," that the spirit of man occupies and controls the whole physical organism, and superintends its growth and repairs? We can thus conceive of the spirit, as a substantial entity, occupying its house, the body; and, with the image of a loved one, constantly and vividly present, so locating the particles of new matter that replace the wasting particles, as to produce an approaching counterpart to its ideal countenance. After years of imperceptible assimilation thus going on, in two loving countenances, the transforming effect becomes visible to the outside world.

Is not this reasonable? May not this process account for the facts? And may it not be called Psycho-Physical Assimilation?

Fraternally, G. R. HAND.

Richmond, Mo.

MORE ABOUT THAT $5000 PRIZE.

Mr. Joseph Goodrich, who offered $5000 as a cash prize, through THE MICROCOSM, to any one who would produce a clear case of sound-interference, hands us the following letter from Prof. Large, which we present with our reply:—

JOSEPH GOODRICH, Esq.:

Dear Sir:—In your postal to me you intimate an entire willingness to pay the $5000 prize offered, if a clear instance of sound interference could be produced. I think if you will consider carefully the case of the falling water, you will be satisfied that this is a clear instance of such interference. Lest you should have forgotten what I wrote about the water-fall I here repeat it. Sitting in my front yard at Big Rapids, and listening to the roar of

the water over the dam in the river, one calm, still evening the noise became less and less and at last ceased. I supposed that the sluice-gate had been lowered, and the water-fall shut off, and thought no more about it. A day or two after, passing by the dam, I saw that there was no sluice-gate and no way of shutting the water off; and on inquiring, learned that the same quantity of water constantly poured over the dam day and night. I became much interested, and after this quite frequently observed it. On a still, calm evening, when not a breath of air was stirring, when not a leaf moved —when you could hear sounds from so great a distance, I have sat and listened to the roar of this water-fall. Suddenly it would cease, just as if it were all shut off. Then it would begin again and get louder and louder till it seemed that twice the amount of water was falling over, then it would die away again until it seemed that no water was falling over at all. Now, what was this but a plain case of sound-interference, to the extent of producing silence? What else could have produced it? There were no currents of air, for it was perfectly still. Not a leaf moving in the least. It only could have been produced by the sound-waves interfering and destroying each other. When these united or combined, the sound was made much louder than usual. We have in this a clear instance of what is called for in THE MICROCOSM, offering the prize of $5000. If you will consider it carefully, you will be satisfied that it is a clear instance of sound interference producing silence. The sound-waves from the one end of the fall met and mingled with the sound-waves from the other end, and the result was they destroyed each other and no sound was heard.

I think, therefore, that I am entitled to the prize you have offered—that I have completely fulfilled the conditions, and that in *honor* you are bound to pay it. I have thus given you the instance called for—am ready to testify to having heard it over and over again; and believe that every intelligent scientist will agree with me, that this is a true instance of sound-interference. Let me, then, hear from you. JAS. S. LARGE.

TRAVERSE CITY, Mich.

REPLY TO THE FOREGOING.

If Prof. Large would first read the sound-discussion in the fifth and sixth chapters of the "*Problem of Human Life*" he would not mistake such phenomena as he describes for so-called sound interference, as taught in our colleges, and as laid down in all our acoustical text-books. He would see that whatever it may be which causes the occasional sonorous augmentation and then silence, it cannot be the interference of two systems of air-waves, from the two ends of the dam as he supposes. This law of sound-interference, as laid down in the books, is one of the simplest things in science. It only lacks the element of truth to make it easily demonstrable so that a child can see its beauty. It tells us that two unison instruments of any pitch, sounded a wave-length apart, will augment each other's volume of tone in line with the two instruments; because the condensations from one instrument will reach the other in time to coalesce with its condensation, and the rarefactions of the one instrument will reach the other in time to coalesce with its rarefactions, thus making the condensations more condensed, and the rarefactions more rarified, and in this way intensifying the sound of each. But if the instruments are placed half a wave-length apart, they will neutralize each other's effects on the air in the line of the two instruments, because the condensations from one instrument will reach the other just in time to coalesce with its rarefactions and *vice versa*, thus producing quiescence of the air and consequent silence; just as two systems of water-waves will destroy each other if they travel together in such manner that the crests of one will fall into the furrows of the other. Now, manifestly, all this is very pretty and simple, and would be true of sound if the wave-theory were true. But as the wave-theory is without the least foundation in truth, hence it makes not the slightest difference in the intensity of sound thus produced by two unison instruments, whether they are sounded a half or whole wave-length apart; and Prof. Large can easily satisfy himself of the truth of our statement and the total fallacy of the wave-theory by having assistants sound two unison pitch-pipes at various distances apart while he listens in line. If he has not in reach such pitch-pipes, we can send them to him by mail for fifty cents each, and thus let him obtain the light he so much needs.

Now, in view of this statement of absolute facts, what does this noise of the water-fall amount to? What right has he to say that the sound-waves from one end of the dam interfere with those from the other end, and thus produce silence; just as if one end of the dam could make one definite system of air-waves, and the other end another? Could he not think of this? How, for example, could he contrive to get one such system of undulations half a wave-length from the other so as to make them interfere according to the law laid down in the books? Suppose one half of the dam extended half-way across the river, say a distance of fifty feet, and that the other half extended as much farther. Suppose we call one half of the dam (fifty feet long) one instrument, and the other half the other instrument. Where are the wave-lengths to begin to be measured from in these two halves, since the two sheets of falling water come together in the middle, and extend all manner of distances apart as they separate toward either shore? These two halves of this continuous sheet of falling water constitute two very strange unison instruments, to say the least! The truth is, Prof. Large has never given the matter one rational, philosophical thought; or he would have seen the absurdity of this pretended claim to interference. Had he reflected scientifically at all he would have seen that the two halves of this dam could by no possibility constitute two such unison instruments as the law requires; and if they could, that it would be impossible to locate their wave-lengths in any definite relation to each other so as to bring their condensations and rarefactions into coalescence or interference. But look at the fallacy of such arbitrary division of that water-fall into two halves. Instead of two instruments constituting this roar, it is a self-evident fact that each separate drop of the water that comes over the dam is an instrument by itself and makes its own independent and individual sound; and it is the combination into one mass of these millions of tiny sounds, which constitutes this roar. Hence, instead of two, there are many millions of distinct instruments all sounding at once. Now, think of a million pairs of these sounding, unison drops, with their two million condensations and two million rarefactions, by millions of chances coalescing all at one time so as to send this loud roar to Prof. Large's "front yard;" and then think of these millions of lucky coincidences continuing without break for a whole minute, while this loud roar

lasts! Then *vice versa*; the two million condensations, by infinite chance, must fall into the two million *rarefactions* at the same time and continue thus, without break to interfere, causing a full minute of silence at the same distance from the dam! The thing is infinitely absurd.

Suppose, however, that the two ends of the dam did really make the two sounds which, by coalescing, produced loudness and by interfering produced silence, as Prof. Large supposes, what should cause this alternation from loudness to silence every once in a while, seeing the two ends of the dam do not change their distances from each other, nor is it likely that the Professor's "front yard" moves about from place to place? Plainly, if these permanently located two ends of the *dam* are the two interfering instruments, silence as well as loudness ought to be absolutely permanent in any locality wherever the one or the other occurs, since sound-waves travel at uniform velocity. Besides, if it really is the interference of the sounds of the two ends of this dam which produces this occasional silence, Prof. Large ought to be able to find plenty of localities at either end of the dam and close to the water where the two systems of air-waves would also interfere and produce silence as well as in his own front yard, a mile or two away! All he would have to do would be to find the suitable odd number of half-wave lengths of that pitch of roar, according to the text-books on sound, where the condensations from one end of the dam would fall into the rarefactions from the other end of the dam, and, of course, quiescence of the air, and consequent silence, must be the result however near to the water, if there be any sense in the text-books or science in this dam-argument of Professor Large. But enough of this. We suspect that the intelligent reader already regards the Professor's position as doubly answered.

But what is really the cause of this alternate loudness and cessation of sound at a distance from a water-fall? By turning to the "*Problem of Human Life*" this whole question will be found exhaustively considered, at pages 266, 267, etc., in which we attempt to account for the difference in the range of the sounds of the fog-horns and steam-sirens as employed in our signal service. Some days the sound can be heard fifteen miles away, while it is entirely inaudible two or three miles from the instrument at the same time and in the same direction. Tyndall tries in vain to account for this mystery by supposing invisible banks of vapor that interfere with the passage of the sound; but finally gives it up as inexplicable by remarking:

"Assuredly, no question of science ever stood so much in need of revision as this of the transmission of sound through the atmosphere. Slowly, but surely, we mastered the question; and the further we advanced, the more plainly it appeared that our reputed knowledge regarding it *was wrong from beginning to end.*" (Lectures on Sound, 3rd Ed., p. 328.)

At this juncture we undertook the solution by assuming a grain-like texture to our invisible but substantial air, and showed its reasonableness by various illustrations. Upon such a view, how simple the conclusion that the structure of the air is constantly undergoing changes, even when there is no wind; alternately presenting the grain-like texture of the atmosphere in a direction suitable to conduct a given sound to the observer at a distance, or to glance the sound over his head or to one side, thus preventing his hearing it entirely, though permitting others to hear it many miles further away, because they happen to be in a mass of air whose molecules are stratified in suitable direction to the sound-pulses. We refer Prof. Large to that discussion. The explanation there given affords at least a rational solution of the problem involved, while the preposterous law of interference, as taught in all our colleges, gives no solution at all; for, plainly, there can no interference occur in a single sound like that of the steam-siren, though this alteration of sound and silence takes place at a distance from such instruments, the same as described by Prof. Large. The following paragraph is the conclusion of our lengthy explanation as referred to in the "*Problem*:"

"There are very few persons who have not at some time or other observed that the ringing of a church or steamboat bell, the roar of a train of cars, or the noise of a cataract, would sound out with great intensity, when at other times it would be scarcely audible in the same positions. Almost universally this has been supposed to be caused by the direction of the wind, while the smallest attention shows this to be a popular mistake—since the same effect will occur exactly when there is not a breath of air stirring either way, and even when the atmosphere is comparatively free from vapor. What law, then, can explain this remarkable phenomenon so beautifully, and, at the same time, so simply, as the possible *stratification* of the air, as I have supposed? That such *grain-like texture* in the air-molecules has not been known heretofore may alone be attributed to the fact that atmosphere itself, though a corporeal substance, is invisible."

VITAL AND MENTAL ORGANISMS.

Editor of the MICROCOSM:

In answer to W. J. Deems, in the September MICROCOSM, on "Vital and Mental Organisms," you say that "A father may have lost both arms, even when a child, yet his offspring are not armless on that account."

Now, is this always true? We have a clear proof to the contrary in lower animals. I knew a mischievous bull that received a severe wound from which he lost his left fore-leg at the body. A calf of this animal was minus also a left fore-leg. It resembled the sire very much in color and form, and was a perfect calf in every other respect, except the absence of this leg, even to its left shoulder. A vast number of witnesses will testify to the truth of this statement. How do you harmonize it with the fact as stated by you? Very truly, yours, B. S. RAYNOR.

SANTEE, Miss.

REPLY TO THE FOREGOING.

The case here related by Mr. Raynor does not disprove the general law we have stated, but is rather one of those exceptions which in a most singular manner goes to prove the rule. We know of no single fact or circumstance which so conclusively tends to demonstrate the existence of a real, substantial, but incorporeal organism in every living creature as the one here related, and the class of facts to which it belongs. We have heretofore shown by elaborate arguments that mental impressions made upon mothers, both human and among lower animals, and retained in the memory or imagination, tend so to shape their own incorporeal organisms as, at very sensitive periods of gestation, to give a similar form to the embryo—first to its incorporeal being and thus to its physical form by constituting the incorporeal form an

outlined pattern, around and through which the bioplasts of the mother's blood may work in weaving the material embryonic structure. This wonderful physiological process can be seen by the mental vision as we may look at the portrait painter filling in the substance, form, and color of his picture by following with brushes the almost invisible outlined sketch which he had at first drawn upon his canvas. In this way, as we can state from our own personal knowledge in numerous cases, mothers have marked their children, producing monstrous forms of hands, feet, and other portions of the body, as the result of monstrous sights, suddenly presented to them during gestation. This is so well known that we need not enter into proofs, as almost every reader is more or less familiar with some such evidence. But even when the sight is not sudden, or when it does not cause fright, an intense desire for, or repugnance toward, a certain form or appearance, may so impress the mother's memory that the peculiarity, whatever it might be, becomes a part of the embryonic being's form.

A case has been recently related to us, by a gentleman, personally cognizant of the fact, of a girl born with but one arm, whose father had lost an arm by accident, when a boy. This seems to contradict our position; but, as before remarked, only proves the truth of the rule, since all his other children were perfect in form. It would seem that this child was thus deformed by an unusual mental impression produced upon the mother by the father's deformity, and, possibly, at an unusually sensitive period, which concurrence the other children escaped.

In our discussion of this question, in the "*Problem of Human Life*," pages 472, 473, etc., we give proofs of similar circumstances in the case of lower animals, observed by breeders, and, as recorded by the critical writer, Alexander Walker, quoted as high authority by Mr. Darwin. He relates a case of a thorough-bred mare that had a colt by a quagga. Some years after, she had another colt by a fine Arabian horse, but, strange to say, this colt had the stripes and stiff, upright mane of the quagga, caused by the impression made upon, and retained, by the mother's memory.

He relates, also a fact, which was well authenticated, of a cow, of a red, hornless breed, on the farm of Mr. Mustard, which ran, for some hours before being taken to the male, with a black and white ox, which broke into the field from a neighboring farm, the result of which, Mr. Walker expresses in these words:

"The ox was white, with black spots, and horned. Mr. Mustard had not a horned beast in his possession, nor one with any white on it. Nevertheless, the product of the following spring was *a black-and-white calf with horns.*" (*Intermarriage*, p. 245.

We could fill this number of THE MICROCOSM with proofs from the best authorities, and gathered by observation, going to show that deformities and monstrosities are quite common, as the result alone of seeing deformed or monstrous objects, and without physical contact. What possible explanation can be given of this state of facts, except the one we have urged, namely, that every creature is a dual organism, and that the monstrous form impresses itself upon the only part of a living being which is possible to be reached at a distance, or without physical contact; and that is the incorporeal part; and that the connection between these two parts or organisms, in the mother, is so intimate as to transfer by some unknown process, the impression thus produced upon one part of her being to the corporeal form of the embryo so mysteriously connected with her? The duality of all living creatures thus seems to us to be fully established by a chain of physiological proofs that confirms the principles of *substantialism* as urged in the "*Problem*," and reiterated in these pages, till the new philosophy may fairly claim standing among the scientific hypotheses, if not theories, of modern times.

THE TIDE-PROBLEM.

To the Editor of the MICROCOSM:

My Dear Sir:—I have just this moment read, with a good deal of interest, the article in your November number, headed, "Electricity, the Motor Power of the Solar System," in which there is a new explanation given of tides; because it brings to my recollection a theory of tides which was introduced to the notice of the students of science in the University of Toronto, nearly ten years ago, by Dr. Chapman, who claimed, I believe, to be its author.

After explaining to us the commonly received theory, which, he said, gave no satisfactory account of the opposite, or antipodal tide, it was asserted, that the earth, being a magnet, would *contract* in the line of *attraction*. This fact, concerning magnets, being susceptible of experimental proof, therefore there would be a *depression* produced at opposite sides of the earth at the same time; as is the case with my biceps muscle, when I endeavor to hold it in a fixed position against any opposing force. So the high tides are only an *apparent rise* of the water, being caused really by the flowing in of the water on all sides to fill up the depressions. Whatever angle the sun and moon may form with the earth, the high tides will be in the line of the resultant of the two attracting forces, which, I understand, is the case; and the enormous attracting influence which the earth must oppose when the sun and moon are on directly opposite sides of the earth, or in a line on one side of the earth will, of course, increase the depressions, and account for the specially high tides which occur at these times.

I have endeavored to state this theory as briefly as possible, which, you perceive, introduces another element besides gravitation. You may consider it of some value, and I therefore take the liberty of sending it.

A most interested reader of your book and paper,

A. CRAWFORD.

MT. HOLLY, O., Nov. 6, 1882.

THE FIRST VOLUME ALL GONE.

☞ We have no more complete sets of the first volume of THE MICROCOSM. We had nearly two thousand copies left over at the close of the first year, but the demand has exhausted them. This possibly accounts for the slackness in sending in names for the reprint of Vol. I. in book form. Now that no more of Vol. I. in old form can be had, it may be that enough names may yet come in to justify issuing it as proposed on second page of cover.

UNIVERSALISM AGAINST ITSELF.

This book will be ready to mail by the time the next number of the MICROCOSM is issued. Those wanting it can send the dollar whenever convenient.

WILFORD'S ✧ MICROCOSM.

23 Park Row, New York, Dec., 1882.

A. WILFORD HALL, Ph.D., Editor and Prop'r.

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SPECIAL NOTICE.

In our conduct of this journal we desire to give our list of excellent contributors the widest possible latitude for the conveyance of their honest convictions, so long, at least, as this liberty does not conflict with the general aim and scope of THE MICROCOSM. But we wish our readers definitely to understand that we do not hold ourselves responsible for the views of our contributors, nor, in fact, even for our own views, as we are liable at any time to change ground on receiving more light, as we have done more than once since this paper was commenced. But, generally, we hope and aim to be consistent. EDITOR.

DOES DEATH END ALL?—No. 3.

We now consider the question—is there a living, intelligent, personal God, the framer of our bodies and the giver of our spirits? Last month we assumed His existence as the basis of our arguments in favor of man's conscious existence after death, and reached what we thought, and still think, to be the only rational conclusion, namely, that if there be such an intelligent personality who can exist outside o a corporeal organism; invisible and intangible to our physical senses, who can think, and plan, and work; then materialism in all its forms breaks down, and man may regard his own future, conscious, personal existence as demonstrably established. Is there, then, such a being as we call God, the Author, Creator, and First Cause of the visible and invisible universe? If so, how can we prove it? How can the absolute presence in Nature of such an invisible, controlling power, which plans her adaptations and moves her forces to their execution, be demonstrated?

Before the theory of evolution had been framed by Mr. Darwin, and carried out by Prof. Hæckel to its legitimate, materialistic, and logical conclusion—the origin of life by spontaneous generation—there was no rational, or even supposable, excuse for denying the existence of a personal God, as the Creator and preserver of the universe. To assume that the countless, ingenious designs in Nature everywhere visible, with the innumerable intelligent adaptations of means to ends (presenting the same evidences of careful thought and study as are seen in a complex machine invented and worked out by man) could have been the result of blind *chance*, was simply ridiculous; and to a logical mind, however inclined to be skeptical, was sufficient alone to break down the atheistic hypothesis. But, with the advent of evolution, as presented and worked out by Mr. Darwin, though it was supposed to weaken, or even to break down the Bible account of creation, the atheistic view received even a severer shock; for in it a personal intelligent Creator was necessarily assumed to exist, in order to conceive, plan and construct the first few simple beings, out of which the entire animal kingdom was to be evolved, by natural selection and survival of the fittest.

Mr. Darwin's "Creator," who was necessarily assumed to have formed these primeval parents of the entire animal kingdom, was thus wiser, more intelligent, and more skillful than any God ever claimed to exist by Christian or heathen philosopher; for these primeval parents—these tiny worms, or monera—were so ingeniously constructed, physically, vitally and mentally, as to embody within them the actual germ-life, germ-organism, and germ-mentality of all animals that have ever since lived—including the human family. What comparison does the Christian's God hold to such a god for infinitude of capability? None whatever.

It was considered enough for the God of the Bible to create the parents of each species with inherent power to transmit their mental and physical peculiarities to their own specific descendants. But the "Creator" of Darwinism gives to a worm the intrinsic power to supply body, soul and intellect, not only to its own species but to a million dissimilar and diversified races, all higher than itself! Darwinians ought to be ready and willing to believe, if necessary, in a score of Gods equal in power and intelligence to the God of the Bible, instead of being skeptical; for what would they all amount to, compared to the God who could do what Darwin's assumed "Creator" did, if his theory be true? It is like comparing a *Howe*, who could invent a sewing machine, and then establish machinery for reproducing other instruments of the same kind, to the inventor who could originate a mere wheel so ingenious and wonderful, and which would embody such mechanical laws and principles that it could, without any further aid from the inventor, turn out in succession, not only all kinds of wheels, but wagons, railroad cars, steam-engines, printing-presses, clocks, watches, looms, sewing machines, and all other mechanical contrivances now in use by man! Such an inventor compares with a Howe as Darwin's God does with the infinite God of the Bible! Think of it, ye atheists!

But this fatal blow at atheism was short-lived; for the idea of a God personally creating a worm, and then retiring forever from the world, and from all care as to how that worm might chance to develop, or whether man should ever exist at all or not, was too preposterous a system for the advanced scientific thinkers of Europe, especially in Germany; and hence, to escape the consequences of a real, living, personal God—which Darwin's theory involved *par excellence*—evolution was carried back to its legitimate basis of a spontaneous generation of the first animal as the start of future development. Of course this was supposed to rid the universe of God entirely, and thus to relieve Darwin's system of development of its only unscientific impediment; for if simple, uncaused, and mindless laws of Nature were capable of spontaneously generating a living, thinking, organic being, without the previous existence either of life or mind in the universe, then, plainly, the same laws would be all-sufficient for carrying on the various processes of development from such being to all other grades of intelligence, even up to the intellect of a Newton or a Milton. Then the system of development, as claimed by Prof. Hæckel, with such a spontaneous origin of life, would be complete, as the connecting link, bridging the hiatus between Kant's system of cosmogony from primeval star-dust, and Darwin's law of development, by natural selection and survival of the fittest.

But the German naturalist who invented this spontaneous substitute for an intelligent Creator, as well as the little albuminous moneron thus brought into being, involved the system of development in even a worse difficulty than to have left it where it was, with a personal God as the Creator of the first moneron—as Darwin was forced to do; for manifestly a law of Nature, or system of laws and forces, which could design and then execute the incomprehensibly complex moneron (as shown so fully in the "*Problem of Human Life*"), must possess mentality and inventive intelligence far surpassing the inventive ability of the scientist who originated this spontaneous solution of the problem. And in what would such an intelligent, inventive system of intangible and invisible laws differ from Darwin's intangible, invisible, and personal creative intelligence, which we understand and designate by the term "God?" Clearly, there is no difference at all save in the name, and "a rose by any other name would smell as sweet;" while an intelligent God under the more scientific appellation of the Laws of Nature would be none the less a real, personal Creator, who might act by these very forces and processes of His own ordaining.

But granting that such intelligent results were thus brought about by simple laws of Nature; who enacted these laws and ordained these wonderful forces, so ingenious and powerful as to be capable of taking a little lifeless dirt and organizing it into a living, thinking, volitional being, whose marvelous complexity and adaptation of parts to wants and uses defy the wisdom of man to comprehend, much more to imitate? This is true even of the tangible, organic structure without reference to the incomparably more mysterious part—the incorporeal entity, the vital and mental organism within the material form—which moves and gives direction to the physical being. That such intelligent laws could exist from eternity without enactment, and with no one to enforce them to the accomplishment of such marvellous results as the organizing of living creatures, at one sweep annihilates the chief objection to the existence of a personal God who is assumed to *be* without having been *created*. We assume only an axiomatic truth, which any candid skeptic must admit, that no *intelligent result* can occur without an *intelligent cause*, any more than the motion of a body can change its direction without adequate counteracting force. Then, plainly, the creation of a living, thinking, voluntary being—even by what we call spontaneous generation—demonstrates previous intelligence, life and will-power in the cause of such creation, whether we call it a self-existent law of Nature, or a self-existent, personal God. Thus, the scientific atheist of this advanced school of evolution, is forced to admit the existence of an intelligent Creator, the same as was Mr.

Darwin; only the former admits it under the guise of natural laws and forces which have all the intelligence, will-power, and ingenuity which an ardent Christian ascribes to the Deity he professes to worship.

But after Prof. Hæckel had thus unwittingly demonstrated the necessity for an intelligent God, under the *nom de plume* of law, who created the first moneron, he goes on just as did Darwin, and supposes, of course, that these self existing, intelligent laws were so ingenious as to construct this "primeval parent of all other organisms", with the absolute, intrinsic germ-life and germ-mentality of all subsequent species and races of animals, including man. Thus, his admission of these intelligent creative laws, as just shown in the case of Darwin's "Creator" of the "first simple forms," involves a God far surpassing in intelligence the God of the Bible; and consequently his is equally fatal to the atheistic hypothesis with the forced admission of Mr. Darwin. But if to avoid this destructive blow at atheism Prof. Hæckel should unreasonably deny any will-power, choice, or intelligence on the part of the laws which so intelligently organized his "primeval parent," then why are not these same universal, self-existent laws of Nature still at work, and all the time at work, creating other simple animals, and thus filling earth, air, and ocean with innumerable varieties of spontaneously generated creatures? On Darwin's assumption of an intelligent God as the "Creator of the first simple beings," there was reason for His ceasing from work by voluntary choice. Christians in this way, also, can account for the absence of continual new creations, by the same voluntary decision on the part of an all-wise Creator. But Hæckel has no such mode of escape for his universal and mindless but intelligently-acting laws. Similar creations to that of the first moneron should be occurring all the time, unless these laws are a real God, with the ingenuity to create one such marvelous "primeval parent" and the will-power then to cease work, as did the God of the Bible or the "Creator" of Darwinism. The fact that but *one* such "spontaneous generation" has ever occurred in the world's history, which Hæckel distinctly teaches, as quoted in the "*Problem of Human Life*," is proof positive that the universal laws and forces which did that intelligent work must constitute a veritable and intelligent God, to the total discomfiture of atheism. Thus Hæckel's attempt to rid the universe of a living God stultifies itself by substituting therefor an intelligent Deity under a false title, who, like the "Creator" of Darwin's system, as far surpasses the ability of the God of the Bible as the intellect of a Humboldt surpasses the mental powers of a moneron.

But after Hæckel has thus stultified himself, and incontinently wiped out atheism, it is pitiable in the extreme to watch his efforts at belittling this "primeval parent of all other organisms" so as to reduce it almost to lifeless matter in the absence of visible organs, hoping thereby to make it such a very trifling little affair, that mindless laws of Nature might be able to produce it without any assistance from an intelligent God! We have replied to this puerile effort of that great German philosopher in the seventh chapter of the "*Problem*," and shown that the fact of its possessing all the functions of life, such as food-assimilation, growth, reproduction by self-division, voluntary motion, etc., makes its organism vastly more wonderful and inexplicable by the very invisibility of its organs under the microscope, since the most complex organism must absolutely be present, or the organic functions could not be so beautifully carried on.

We have thus demonstrated the existence of an uncreated, intelligent God by using the strongest effort at disproving His existence ever made, and by the ablest atheist living. The creation of the first animal out of inorganic matter with its complex organism, vital functions, mental powers, voluntary instincts, and the marvelous design, adjustment of parts, and adaptation of functions to ends and uses, needs only to be elaborated, and atheism can find no possible resting-place in the mind of anyone who is capable of the least consecutive or logical thought.

Evidences of the same intelligent design and inventive skill can be seen everywhere in Nature, with the additional and crowning proof of an intelligent creative power in the display of *artistic taste*, which can have no possible use except to gratify a love for the beautiful, and which could not have originated except by mental effort and as the product of a high order of intelligence, since chance is totally out of the question. These displays of artistic taste and skill can be found under conditions and in forms which render explanation entirely impossible either by appeal to natural selection or sexual selection—the only two laws claimed as in any way accounting for the intelligent adaptation of parts to uses or the artistic adornment of birds and other animals. When any peculiarity of animal structure, form, or color, is not serviceable to its possessor in the struggle for life, it is admittedly outside of evolution by survival of the fittest—since Darwin, Hæckel, and all writers admit that natural selection can only produce forms, colors, designs, and patterns that are of use to the being thus constructed and ornamented. But they claim that sexual selection will account in these respects for what natural selection fails to explain. Then, if numerous beautiful designs and patterns of the most brilliant tints and artistic symmetry of figure can be found where they are not only of no use to the beings possessing them, and entirely beyond the possibility of development by sexual choice from generation to

generation, as required by the theory, then they must be admitted to be the product of a creative intelligence above, and independent of, Nature in their original formation. We gave an abundance of evidence of the existence of just such displays of inventive skill and artistic taste in the seventh chapter of the "*Problem of Human Life*," where they were confessedly outside of and entirely beyond both natural and sexual selection, and, consequently, must have been the product of an intellect like our own, but of infinite variety and expansion; since, as we showed, without intelligence and artistic taste, they could not have come into existence. Take, for example, the beautiful tints and exquisite patterns in the feathers of birds that are so small as to be impossible to have been seen and selected in pairing (to which Darwin attributes all sexual selection) since we can only see them by the aid of the microscope. These arrangements of shadings, tints, and geometrical lines exhibit intelligent design and artistic discrimination of the highest order; and as they are neither useful nor ornamental to the birds thus adorned —since they cannot distinguish them, and since they could not have come by chance, any more than could the miniature painting of a landscape or the figures of the multiplication table—it follows that such exhibitions of ingenuity and artistic taste owe their conception and origin to an intelligent creative power above the known laws of Nature. This is particularly shown in the microscopic shells of ocean, where Mr. Darwin admits that sexual selection cannot come into play, and where these tints and patterns are of no use to the mollusks. What is marvelous and most confounding to the atheist is the fact that the finest tinted shells come from the darkest caverns of ocean-depths, where no light penetrates, and where none but the all-seeing eye could have penetrated to execute such designs in colors and geometrical lines. And in viewing these shells, dredged from rayless depths, the higher the power of the microscope applied, the more artistic the tints and the more symmetrical and ingenious the patterns become. What mind but that of an infinite intelligence could have conceived, and then designed, and then drawn, these wonderful patterns and shadings, and then ordained the laws and forces by which they could be thus reproduced from generation to generation in the darkest caves of the ocean? To deny the existence of God who can see all objects from the least to the greatest in the vast realms of the universe, is to relegate these ingenious and artistic productions of Nature to no cause but that of blind chance, which is simply an infinite absurdity, by the side of which the existence of God becomes a simple proposition.

Since evolution, in its wildest range of conjecture, either according to Darwin or Hæckel, does not even pretend to account for these intelligent adaptations of skill and art to the beautiful in Nature, as viewed by the highest intelligences on earth, they are compelled to acknowledge an intelligent origin for such otherwise inexplicable mysteries. The argument of *design*, then, if logically viewed, alone demonstrates the existence of an intelligence above Nature, as the first cause and rational solution of the countless wonders all around us, and no explanation of such intelligent power so completely satisfies the mind as to make it identical with the God of the Bible—"Who spake and it was done; who commanded and it stood fast."

NEWTON'S GREAT OVERSIGHT.—No. 2.

In the October MICROCOSM, we charged Newton with an oversight in his calculations concerning the moon's fall from the tangent which, if correct, must prove completely disastrous to his great mathematical demonstration upon which the law of gravity has always been supposed to be established. Since that article was published, we have received numerous indorsements and congratulations from mathematicians who admit that Newton's demonstration is at last fairly overturned, if our charge is sustained. But, as stated, last month, Prof. Goodenow is an exception, and, in a letter marked *private*, speaks in the most uncomplimentary manner of our claimed disclosure; counter-charging that we have not only grossly falsified the *Principia* and misrepresented Newton, but that we have made ourself "ridiculous" in thus charging that distinguished philosopher with having left out *one-eightieth* of the moon's fall by ignoring the moon's attraction of itself toward the earth *one-eightieth* as much as the earth attracts it, and in addition thereto; and he adds, that "*that very allowance is one of the most prominent features of Newton.*"

As we remarked last month, this is a most serious counter-charge, and squarely presents the issue for veracity, or else for downright, inexcusable stupidity, between Prof. Goodenow and ourself; and that issue we propose shall now come to a public trial. It is wholly unnecessary for us to reiterate our charge against Newton to those who have carefully read the article in the October MICROCOSM. But lest new readers may see this article, we will, as concisely as possible, restate our indictment. It is this:—

Newton, before stating his demonstration, plainly and unmistakably recognizes the fact that the moon, which is about *one-eightieth* the mass or weight of the earth, pulls at the earth with about *one-eightieth* as much force as the earth exerts upon the moon. No dispute at all about this; but in formulating his law and demonstration, he overlooks the fact that in thus pulling at the earth *the moon also pulls itself toward the earth, or from its tangent, with one-eightieth as much force as the earth exerts upon*

*it, and in addition thereto.** Here, then, is our charge against Newton definitely stated; and it is either demonstrably true or, as Prof. Goodenow asserts, "ridiculously false." That it is plainly true we shall proceed to show from Newton's own words, as will be quoted from the *Principia*; but before doing so, we wish to emphasize the fact that Prof. Goodenow, in thus charging us with falsifying the *Principia*, and by insisting that Newton did not leave out this *one-eightieth* of the moon's fall, *actually admits that the law and demonstration of Newton would break down if our charge could be sustained.* With this definite admission on the part of Prof. Goodenow, we will now prove our charge true to the letter.

In the first place, Newton's entire reasoning upon the moon's fall from the tangent, as every student knows, compares it to the fall of a stone, or other heavy body, on the earth's surface; and throughout his demonstration he makes the gravity-fall of the moon precisely the same as the gravity-fall of the stone here, only lessened in reaching the moon as the square of the distance (60 radii of the earth); thus making the fall of the moon exactly one 3,600th (60x60) that of the stone's fall on the earth in the same time. This fall of both moon and stone he attributes alone to the gravity-pull of the earth, and does not even remotely hint that any portion of the moon's fall is caused by its self-attraction of the earth. Is not this a patent fact known and read of all men? Had Newton thought of the existence of such a factor at all, it would have exploded his demonstration, for he would have seen that while the stone's pull of itself downward is incalculably small—not the one million millionth that of the earth's pull in proportion to mass—the moon's pull of itself is manifestly *one-eightieth* that of the earth and in addition thereto. But Newton does not make the least allusion (much less make it "the most prominent feature") to this *one-eightieth* excess of the moon's fall over that of the pebble, but positively excludes it in stating his demonstration; and then afterward, in explaining the demonstration, *he declares in so many words, that he did not include it!* We will first examine his statement of the demonstration itself.

He says that the moon in following its orbital path, will fall, if measured perpendicularly from a fixed tangent, "15 1-12 Paris feet in *one minute*, or, more accurately, 15 feet, 1 inch, 1 line 4-9."

He then proceeds with his great demonstration of the law of gravity, in these words:—

"Wherefore, since that force [the earth's attraction, not the moon's, of course,] in approaching the earth in the reciprocal duplicate proportion of the distance, and upon that account at the surface of the earth is 60x60 times greater than at the moon, a body in our regions, falling with that force [the same attraction by the earth, of course,] ought, in the space of *one minute of time*, to describe 60x60x 15 1-12 Paris feet; and in the space of *one second of time*, to describe 15 1-12 of those feet, or more accurately, 15 feet, 1 inch and 1 line 4-9. *And with this very force we actually find that bodies here upon earth do really descend.*"—*Principia, Book III, Prop. IV.*

Thus Newton shows by his own statement of his demonstration, that the identical and unaided force of the earth's gravity, which brings down a falling pebble, 15 1-12 Paris feet here, alone pulls the moon from the tangent, weakened, of course, as the square of the distance from here to the moon, or reduced 3,600 fold. Not a hint does he give that the moon's attraction of the earth adds anything to its own fall, any more than the falling stone's attraction of the earth adds to its fall. The moon's attraction of the earth, in fact, had nothing to do in this calculation, since manifestly the stone's infinitesimal attraction of the earth could not have been a factor in the premises.

But we now silence the objector's batteries by asking Newton to explain his own demonstration, and to tell us definitely whether or not he took any account of the moon's pull of itself toward the earth any more than he did of the pebble's pull of itself. He answers emphatically that he never thought of such a factor, by telling us, if a stone were to be taken to the moon's orbit, and if both moon and stone were to be let drop at one time, *they would fall with precisely the same velocity and would reach the earth in the same time,* thus totally ignoring everything in the premises save the earth's attraction of both moon and pebble. Here are his own words:

"Should we imagine our terrestrial bodies [such as pebbles] removed to the orbit of the moon, and there together with the moon, deprived of all motion to be let go so as to fall together toward the earth, *it is certain from what we have demonstrated before* [the "demonstration" just quoted], *that in equal times they would describe equal spaces with the moon.*"—*Book III, Prop. VI.*

If any doubt could have existed, in reading the figures of Newton's demonstration, before quoted, this simple illustration and explanation of his law, settles the question and sustains our charge to the letter. Newton not only shows that he took no account of this important factor of the moon's pull of itself toward the earth, but he absolutely excludes such an idea by assuring us that he means to be understood that a pebble at the moon's distance from the earth, and which is not a million millionth the mass of the earth, would fall with

*In our October article we made a mistake in stating that the moon pulls the earth from its otherwise normal position one 80th as much as the earth pulls the moon. We should have said that the earth *pulls itself* out of its otherwise normal position by its attraction of the moon, one eightieth as much as it pulls the moon, while the moon also displaces the earth in addition thereto and in the same direction one 80th as much as it displaces itself by its attraction of the earth. This *double displacement* of both earth and moon, thus corrected, is what Newton entirely overlooked in framing his law of gravitation.

the same velocity as would the moon, thus leaving the moon's self attraction entirely out of the account. And to show that this was exactly in accordance with his great demonstration of the law of gravity, he refers back to that demonstration by declaring that this equal velocity of fall of both moon and pebble "*is certain from what we have demonstrated before!*"

Thus, no man living will dare to gainsay this evidence of the correctness of our charge, unless he is totally reckless as to what he says. In the light of such proof, what are we to think of Prof. Goodenow's counter-charge that we have ignorantly misrepresented Newton, falsified the *Principia*, and rendered ourself ridiculous by such a charge? Very few of our readers will envy his predicament as a great mathematician and astronomer; for, clearly, Newton tells us, in explaining his own demonstration, that he took no account whatever of the moon's pull of itself toward the earth, any more than he would have taken account of a pebble's pull of itself had it been in the place of the moon, since both would fall toward the earth with the same velocity as they would both fall by the earth's attraction alone. It was, therefore, absolutely impossible for Newton to have recognized the fact, so clearly pointed out in our disclosure, that the moon actually pulls itself toward the earth *one-eightieth*, in addition to the earth's pull. If he had recognized such a fact, he would not have piled blunder upon blunder by teaching, as he has done, that the moon and a pebble, let go together, would fall toward the earth with the same velocity, since it must now be clear to the mind of a child, that the moon would outstrip the pebble *one-eightieth*, or fully 3,000 miles, in falling to the earth; because, while the pebble would have only the earth's attraction to bring it down, the moon would have that force, the same as the pebble, and, in addition thereto, one-eightieth as much more by its own pull of itself toward the earth. What statement in science can possibly be more self-evident than this?

But this illustration of Newton's, in which he explains his demonstration, is not an isolated case, by any means. The *Principia* is full of similar evidence. In treating on the moon's of Jupiter, he also totally ignores their attraction of themselves toward their primary, in proportion to their mass, just as he does with regard to our moon, and tells us that if they were all four to be let drop together from equal heights, they would fall toward Jupiter with equal velocity, notwithstanding the largest of those moons is nearly three times the mass of the smallest! His words are:

"These satellites, if supposed to fall toward Jupiter from equal heights, *would describe equal spaces in equal times in like manner as heavy bodies do on our earth.*"

To show, however, the erroneous character of this teaching, suppose our earth to have another moon, twice the mass of the present one, and both let drop from equal heights,—what would be the result? Newton tells us that they would "describe equal spaces in equal times, in like manner as heavy bodies do on our earth." But the fact is, that while our present moon would add but *one-eightieth* to its fall, in addition to the earth's attraction, the larger moon would add *one-fortieth* to its fall. Thus, while our present moon would add one foot of fall by its own pull of the earth, for every eighty feet of fall caused by the earth's attraction—,making eighty-one feet,—the larger moon would add one foot to its fall in every forty, or two feet to every eighty, making eighty-two in the same time. In this manner the larger moon would gain one foot in every eighty-one feet fallen by our present moon, and consequently would outstrip it nearly sixty-six feet in every mile fallen, or about 3,000 miles in reaching the earth. But all this was too heavy for Newton's "pure mathematics," though it enabled him to figure the moon's fall from the tangent down to "4-9," of a *line*, while leaving out *one-eightieth* of the entire fall!

In the light of this overwhelming evidence of the truth of our indictment, it is plain that it was only the bare accident that our moon was no larger than it is, that saved the greatest scientist the world ever saw from a more crushing humiliation by this disclosure. Suppose our moon had been *one-quarter* the earth's mass instead of *one-eightieth* as at present, it is plain that Newton would have been just as oblivious to the fact that it had any tendency to pull itself toward the earth any more than would a pebble let go at the same distance. Or, had the moon, for example, been one-half the earth's mass, it is plain that Newton would have thought, just as we have quoted, that such a moon and a pebble, let drop together from equal heights, would fall toward the earth with equal velocity! Whereas, it is a fact that such a moon would fall *one-half faster than the pebble*, having not only the same gravity-pull from the earth that the pebble would have, but one-half more in addition, in consequence of its own pull of itself toward the earth with half the force that the earth would exert upon it. It would thus reach the earth in advance of the pebble about 80,000 miles. Was ever anything plainer? Yet Newton did not see it, and neither has Prof. Goodenow, through all this discussion, seen it, until we called his attention to it, or he would have understood Newton's clear teaching better than to charge, so recklessly, that we had falsified the *Principia* and slandered its author. We thus place on record in THE MICROCOSM our charge against Newton with our proofs, by the side of Prof. Goodenow's counter-charge against us, and most gladly will we await the impartial verdict of history.

The truth is, this fatal oversight of Newton, in

his so-called mathematical demonstration, is in complete harmony with his other teachings, as shown in our October article. But suppose Prof. Goodenow could actually prove that in some other part of his writings, Newton had recognised the moon's pull of itself from the tangent *one-eightieth* as much as the earth pulls it, he would simply be proving him dishonest in knowing of such an important factor while not allowing for it when stating his great demonstration—the very place where it was essential in order to give a truthful result! Our charitable view—that it was purely an oversight on the part of Newton, in thus leaving out one-eightieth of the value—relieves his memory from the charge of trickery, but fastens upon it something else not at all desirable in so renowned a scientific reputation; because the great so-called law of gravitation, which this disclose shatters (provided our charge stands unmet), is the chief, and almost the sole achievment which has given Newton his fame, or which places him above other good geometricians. Let this law and the world-renowned demonstration, which was supposed to establish it, break down, and what would there be left of this posthumous reputation, worth the sigh of an envious heart?

We will not now assert that no writer has ever made the allowance here charged against Newton, for we do not claim to have read all that has been written upon the subject of astronomy; but we do charge, as herein specified and proved, that Newton, in framing the law of gravitation, not only overlooked this one-eightieth value, but positively excluded it from his figures, and, in consequence, that his law and demonstration necessarily break down.

The present paper is already longer than we had intended to make it, though we have not presented a quarter of the evidence at hand in proof of our charge. Next month we promise to finish it, and will show that Newton is not alone in this unfortunate oversight, so fatal to the law of gravitation. In conclusion, as an offset to Prof. Goodenow's uncomplimentary counter-charge, we have a letter from the profound mathematician, Dr. Lawrence S. Benson, of Jersey City, N. J., author of two works on mathematics and geometery, who says, among other flattering things, after reading the October article:

"Your arguments are certainly indisputable. You may rest assured that no advocate of Newton will, or can ever, answer your strictures upon his reasoning about gravitation."

Our next paper will also embrace the question of the common centre of gravity of moon and earth, in which the received view will be shown to be no less defective and self-contradictory than is Newton's demonstration, and that the real nature of the mutual and reciprocal attraction of spheres has been entirely overlooked.

PRINCETON COLLEGE HEARD FROM.

Ever since the revised edition of the *"Problem of Human Life"* has been issued, we have been receiving letters asking why no word of response had come from Dr. McCosh, the worthy president of Princeton College, whose views of evolution and spontaneous generation were so definitely criticised in that book. Several friends of the Doctor assured us that we would yet hear from Princeton, and that when it did come the *"Problem"* would catch it. Well, we have at last heard from that famous seat of learning—not direct from the President, but through his leading and confidential Professor of Natural Science, Prof. G. Macloskie, of that college, in a sneering criticism printed in the *"Presbyterian Review,"* for October.

Now there is little doubt but that this criticism embodies the bulk of the learning of that chair upon the subject involved, both from Professor and President; and if the *"Problem"* is not stamped out by the prodigious effort, it can safely defy Princeton and its whole faculty hereafter. Let us briefly examine the points made by Prof. Macloskie, and see what they amount to. He starts out by saying:

"It is because we value our *precious religion* that we notice a book which defends it with the weapons of *ignorance* and *reckless speculations*; and which is so plausible as to have secured the endorsement of editors, clergymen, and teachers of science."

And among the reckless speculations, he particularizes the assumption of the author that "light, sound, gravitation, heat, electricity, and magnetism are as much substances as are matter and spirit." He also states that "at great length he endeavors to overturn the common theory of sound, and to prove against Mr. Tyndall, that it is substance," etc. Now it would have been to some purpose, after specifying these scientific heresies, had Prof. Macloskie briefly tried his hand at argument, and given even one good reason why sound, light, heat, magnetism, electricity, gravitation, etc., might not be incorporial substances as much as spirit; and why Prof. Tyndall might not be in error, although his theory is taught in all colleges. Not a word, however, does he write to show the author to be mistaken in these positions, but merely states his views, in a contemptuous way, sneers at them, calls them "reckless speculations," and the result of "ignorance," just as all bigotry makes its appeals to popular prejudice, and just as the high scientific authorities of the colleges in the time of Copernicus and Galileo excited popular prejudice against the new scientific discoveries of those men because they antagonized the received theory of astronomy, and were supposed by the church dignitaries of those times to interfere with their "precious religion."

How much more sensible and fair would it have been in Dr. McCosh and his scientific adviser, if

they had any respect for their precious religion, or wished it to be respected by others, instead of sneering at a book they know they cannot answer, had they invited Prof. Alfred M. Mayer of Hoboken, the great American physicist, to answer that "reckless speculation" on sound in a series of papers in the "*Princeton Review*;" especially would this have looked like an honest effort in favor of true religion and true science, seeing that "*editors, clergymen*, and *teachers of science*" by the thousand are endorsing that book. Dr. McCosh knows very well that we have urged Prof. Mayer over and over to undertake the defense of the wave-theory of sound in a series of articles, proposing the free use of the columns of THE MICROCOSM for a year or longer for that purpose. Prof. Mayer, however, for reasons, no doubt, of his own, declines to accept our generous offer. But should Dr. McCosh and Prof. Macloskie jointly invite him to do this in the columns of the "*Princeton Review*," and insist upon it in the interests of science and religion, on the ground that thousands of "clergymen and teachers of science" are being misled by the "reckless speculations" of that ignorant author, Prof. Mayer would no longer feel at liberty to refuse to defend the received theory of acoustics, and would thus be forced to come to the rescue or else throw up his hands as a sign of unconditional surrender. Now we put the issue squarely before President McCosh and the college faculty, and pledge them that THE MICROCOSM will print such a series of papers from the pen of Prof. Mayer in defense of the old theory, if they can induce him to write them for the "*Princeton Review*." If they are sincere about their "precious religion" after knowing that so many of the clergy have been deceived by these "reckless speculations" on sound, and if they wish to expose the "ignorance" that can thus win the "endorsement of editors and teachers of science," now is a golden opportunity, and we trust that the friends of Princeton College and of its distinguished President will insist by letter upon the fairness and importance of the course we here suggest.

But a word as to the success with which Prof. Macloskie has assailed a book which has been thus capable of deceiving the very elect. Has he shown himself competent to be put forward for such a responsible task? Has he proved himself, in this effort, worthy of such a famous institution of learning as Princeton, or a credit to such a journal as the "*Presbyterian Review?*" Let us see.

He says the author "does not understand evolution as it is usually held by its adherents." Then he specifies in what particulars the author differs from the received view by adding, "He supposes that according to it a monkey may be descended from a tortoise or a fish from an ascidian." Strange as it may seem, Prof. Macloskie denies this fact, so well known to be taught by all evolutionists. What, in the name of Darwinism, did the monkey descend from—if not from the reptile, the fish, the ascidian, etc.? Where did it get its so-called embryonic gills, but from the fish? Then the critic says that the author states "a fact new to science, that the adult ascidian loses its gills." Yet right where he found that statement in the "*Problem*," pages 378, 379, he will find the very quotations from Prof. Hæckel's "Evolution of Man," in which that author distinctly asserts that the young ascidian, as it matures, develops *gills, tail, medullary tube, notochord*, etc., all of which disappear in the old ascidian as it "sinks to the bottom of the sea," "undergoes fatty degeneration, and becomes a shapeless bag." But why expect such a critic to know what is new or old in science? Of all the meaningless attempts at a clear statement ever put into words, as a scientific criticism, this article contains the most marked specimens. Take this for a sample, which we copy *verbatim*: "He *ascribes muscles* [yes; positively *a*scribes] *as something similar to a mover*, but he might as well *ascribe them to a drop of water*, as both are *equally fluent;* he blunders by supposing that the *mover* multiplies only by self-division; and he blunders again by supposing that its self-divisions occur at random, so as to render material continuity impossible between its generations"!

Now, what he means by "muscle;"—what he is trying to get at by the sentence: "He *ascribes* muscles to *something similar to a mover;*" and especially what he means by a "mover," are no doubt among the mysteries of "theistic evolution," as taught at Princeton College, which that professor seems to be trying to defend. Then, again, what are we to understand by the sentence, "He might as well *a*scribe them to a *drop of water*, as both are *equally fluent?*" Does he mean that a *mover* is equally *liquid* with a drop of water or equally *wordy or garrulous*, as "fluent" may mean either? If he means equally *liquid*, then what is a "*mover?*" It must also be a liquid of some kind, and as mobile as water, since it is "equally *fluent.*" But he shows us that by a "mover" he really has reference to Hækel's little albuminous "moneron," found in lumps at the bottom of the ocean, since he speaks of its self-divisions; though how he can have reference to these solid little animals in his remarkably clear *a*scription as "equally fluent" with a "drop of water," is another of Princeton's mysteries. But a worse trouble presents itself in this "fluent" *ascription*. The eminent professor accuses the author with teaching that the "mover" divides itself "at *random*." Although absurdly false—in what other way would a "drop of water," or anything else "equally fluent," divide itself? Hence, the darkness intensifies as we try to find out what this "mover," so scientifically "*ascribed*," can really mean. Webster defines a *mover* as "A person or a thing which *moves*."

It might, therefore, mean a *tadpole*, which besports itself in stagnant water, were it not for its *fluency*; or it might refer to a chronic renter in New York tenement houses, who moves every May-day, since he is especially "fluent" against his landlords, *ascribing* them as very mean men! But we give it up, and appeal to the students of Princeton College, who are familiar with the professor's style, and trust that some one of them will write us a letter and "ascribe" to us, in as "fluent" a manner as possible, what the professor was trying to drive at, and we will publish it in THE MICROCOSM.

HERBERT SPENCER AND EVOLUTION.

At a dinner given to Herbert Spencer at Delmonico's, on the eve of his departure home to England, he made a very able and interesting speech which contained much sound philosophy pertaining to civilization and sociology. He barely alluded to the doctrine of evolution. But Prof. Marsh, of Yale College, and Prof. Fiske, of Harvard, spoke definitely on the development theory, assuming its absolute truth as scientifically settled. Prof. Marsh distinctly stated in his speech that "the battle of evolution *has been fought and won.* The problem of the origin of species, once thought to be insoluble, had been *definitely determined*, and the great law of change *demonstrated.* * * * * * Evolution has cleared away the darkness, and marked out the path of future science."

Now all this we deny, and if Prof. Marsh or Prof. Fiske thinks evolution "*definitely determined*," and its laws "demonstrated," they have a splended opportunity to convince the people of this country of such important fact through the columns of THE MICROCOSM. This paper reaches many thousands of clergymen of all denominations, who would candidly read the arguments in favor of evolution which might be presented by either of those two American representatives of Darwin's theory of descent.

Hence, without circumlocution we now ask, will either of those eminent scientists accept the invitation we here propose, to fill two pages of this journal each month with their scientific proofs in favor of the truth of evolution? They will not be restricted to any particular branch of Darwin's throry, but can begin where they please with their proofs—either with Hæckel's moneron, Darwin's ascidian larva, or Huxley's orohippus. Our readers will be delighted with such an opportunity to read the *pro* as well as the *con* of Darwinism, for we will take care that the proofs thus presented will be analyzed and sifted.

We thus present an open invitation to these distinguished evolutionists who believe that "the battle has been fought and won," and that the theory has been "demonstrated," and ask them kindly to fight it over again and demonstrate it just once more in these columns for the benefit of more than 6,000 liberal-minded clergymen who read THE MICROCOSM. Will either of those Professors oblige these readers and the public generally, by accepting this offer? We shall see.

REPLY TO THE "CHRISTIAN STANDARD."

Last month we printed the argument of the "*Christian Standard*," with its diagram, aimed to sustain Newton's law of gravitation, as based upon his world-renowned demonstration of the moon's fall from the tangent. We trust the reader has studied it. If not, he should now turn to the November number and read it, before considering this reply.

It is manifest that the editor wrote that article before seeing our review of Prof. Kemper, in the October MICROCOSM. Had he read that reply, he would have realized in advance how vain it is to talk about the moon's fall from a fixed tangent, as "mathematically correct," even for the smallest measurable arc of the moon's travel, or fraction of a second. In our reply to Prof. Kemper, we showed that this distinguished professor of mathematics and astronomy, at Bethany College, was compelled to admit, in his "*Standard*" article (August 9th), that "It is only for *very small arcs* that the tangent deflections are as the *square of the times*," or in accordance with the law of acceleration in the direct fall of bodies. We also showed by quotations from his article (too long to repeat here), that he frankly admitted that even with a "very small arc" the "line of the earth's attraction of the moon" was not mathematically correct, but only "practically" so, to use his own language, because even during the smallest measurable arc of the moon's travel the moon cannot be pulled directly *from* the the tangent by the earth's attraction, since the line of attraction changes to a partly backward pull of the moon in relation to such tangent. Hence, Prof. Kemper admitted that it was only at the exact start of the tangent, or only when the line of the moon and earth is at exact right-angles to the tangent, that the earth's pull from it can be mathematically correct. Of course the professor was right, as every tyro in natural philosophy must see, and as Prof. Goodenow has frequently admitted. He, also, went further, as we showed by quotations, and stated that the larger the arc employed, the less "practically" correct the measurement of such line of direction would become; since the farther the moon had traveled away from the fixed tangent, the less the earth's attraction would pull directly from it (either by Newton's or Goodenow's method of measurement), until at 90°, or zero, Prof. Kemper admitted that the pull of the moon from such fixed tangent would entirely die out, as it would be exactly backward, and, of course, parallel with the tangent, instead of from it. He was right, also, is this, as THE MICROCOSM has all the time insisted. Hence, we have his forced admission that the smallest conceivable arc of the moon's travel could be only "practically" correct, as it would be a *very little* away from direct pull, thus surrendering Newton's greatest achievement as not a mathematical demonstration at all, but merely an "approximate measurement," as Prof. Goodenow expressed it in his article last month. This was a most humiliating tumble for Sir Isaac Newton, and one, of course, that no astronomer would ever have thought of aiding or admitting before THE MICROCOSM began pointing out Newton's mistakes.

Is it possible that learned astronomers have actually been compelled by THE MICROCOSM to confess that the greatest "mathematical demonstration" of Newton was only "practically," or "approximately correct," "not exactly the correct method" but "only a rough measurement" under the most favorable conditions of "very small arcs?" Such is the positive fact, as here recorded.

But what has the Editor to say after all these fatal concessions by two such eminent professors of astronomy? Not having comprehended Prof. Kemper's original article, which he had printed with his approval, and should have studied, he supposed that Newton's method was mathematically correct, at least for small arcs or intervals of time, though wrong, as he admits, for larger arcs. Hence, he says: "We *do know* that his method was *correct* for the length of time he used."

Prof. Kemper did not "know" this; but says it was only "practically" correct, and Prof. Goodenow, in the very article copied into the "*Standard*" from the August MICROCOSM with his spiral diagram, says:

"Let it be observed [Will the "*Standard*" Editor please *observe* it?] that the measurement from the tangent perpendicularly downward [the way Newton measured] is not the exactly *correct method*, but is only *roughly used as sufficiently accurate* for a short distance from the starting tangent?"

Prof. Kemper chimes in and says, "You are right, Brother Goodenow, in saying that Newton's method is incorrect, and only a "rough measurement," for I have found (since THE MICROCOSM forced me to it) that it is only "practically" correct, even when a "very small arc" is employed"! But the "*Standard*" editor talks back, and says you are both wrong; for "*We do know that his method was correct for the length of time he used*"! And thus these scientists have it hip and thigh over Newton's "rough measurement," while THE MICROCOSM looks on and gathers up the broken bits of that famous "yardstick."

But let us see if the Editor of the "*Standard*" really understands what he is writing about. If he does, he will of course be consistent and not contradict himself. But he is not consistent. Here is his first self-contradiction; for he not only contradicts both Kemper and Goodenow, as we see, but he also extends this courtesy to himself. Notice his explicit language:

"The fact that Newton used so short a time, is evidence that he *knew* that his method was applicable *only* to short measurements."

This excludes the possibility of a longer arc or time than Newton used. But hear the Editor again:

"We do not say that Newton could not have made a *longer measurement*, or that longer measurements would not have answered his purpose as well, *or even better*"!

This is funny, to say the least, for "pure mathematics." First, that Newton "*knew* that his method was applicable *only* to *short* measurements," and, second a clear intimation that he could have made "longer measurements" had he wished to, and that longer measurements might have suited "as well, or even better"! How would it be possible for a "longer measurement" to suit "even better," when Newton "*knew* that his method was applicable *only* to short measurements?"

After this he repeats, and emphasizes it, that Newton's method "was correct" (that is, of course, *mathematically* correct) "for short measurements." See how persistently he opposes Kemper's "practically" correct method, and Goodenow's "rough" estimate of Newton's measurement. He says:

"We merely *emphasize* the fact that he [Newton] did only use a short measurement, and that his method *was correct* for short measurements."

Thus he wished it to be *emphatically* understood and without any qualification whatever, that Newton's "short measurement *was correct*," Goodenow and Kemper to the contrary notwithstanding. But after writing thus far, it is plain that the Editor stopped, possibly to rest while he read over again Kemper's and Goodenow's articles in the "*Standard*," in which they both contradict him by teaching that Newton's was "not exactly the correct method," but was only "practically" or "roughly used as *sufficiently* accurate for a *very short distance*." He now says to himself:

"I guess I'm getting a little bit muddled on this tangent business, and might, if not careful, put my scientific foot in it! I had better take in sail and not go ahead quite so precipitately, as there are indications of a storm. I must look out what I am saying about Newton's method being "correct" and *emphasizing* it while these stupid fellows—Kemper and Goodenow—are giving Newton away to THE MICROCOSM by admitting that his method, even under the most favorable conditions—very small arcs—is only "practically" correct and roughly used as a rude measurement, etc., etc. In fact, I had better be in company with these two professors than to be left out in the cold, as I might get into a fix with this MICROCOSM fellow, that I would need their assistance; so I will gently get out of it by modifying my statement as well as I can so that we may appear not to contradict each other very much after all." So saying, he takes up his pen and writes:

"Newton's method may have been *sufficiently correct* for a short fall;" and as if this were not quite strong enough to agree with the two professors he had so abruptly contradicted, he adds that such a fall would be "*substantially correct*"!

Thus he, too, gives Newton away to THE MICROCOSM by admitting with Kemper and Goodenow, that this famous moon-demonstration was no mathematical demonstration at all; since nothing can be mathematically correct which is only "substantially correct," or "sufficiently correct for a short fall." Really a writer who can so completely stultify himself, and surrender the whole argument as to Newton's world-renowned mathematical (!) demonstration, needs no reply for intelligent readers save to analyze his different statements and point out their incoherency.

Let us then take another example of the flattest possible self-contradiction from where he attempts to explain the fall of a cannon ball when fired horizontally as he illustrates, from "the top of a tower 257 feet high," and which, he tells us "*will reach the ground in precisely the same time whether the horizontal velocity be less or more—namely, in four seconds.*" Yet he positively goes on immediately after to prove with Newton that if the ball should be fired with sufficient "horizontal velocity" it would not "reach the ground" at all, but would go entirely around the earth in an orbit as he illustratates by his own diagram. How in the name of sense or science could such a ball "reach the *ground*" "in four seconds," "*whatever the horizontal velocity*," when Newton and the Editor of the *Standard* both agree that if it had enough "horizontal velocity" it would not reach the ground at all, but would keep on forever in a uniform orbit around the earth at the height of the tower, provided it met with no obstruction? Yet THE MICROCOSM is expected to reply to such self-contradictory arguments as these, which make up

the bulk of what is said in defense of Newton's great law. The Editor is, of course, right in supposing with Newton that such a cannon ball, if fired horizontally from a great elevation with sufficient velocity would go entirely around the earth; but the moment the projectile force should exactly equal gravity, so as to keep the ball in a circular orbit equally distant from the sea level, it is plain that all acceleration of fall ceases, as Prof. Goodenow admits. We showed last month that there can be no accelerated fall in such an orbit, since the motion, both deflective and along the curved path, is perfectly uniform, or exactly equal in equal periods of time, and that the apparent accelerated increase of distance from a fixed tangent is not accelerated fall, and not even its real appearance, since no fixed tangent can be maintained even for the small fraction of a second without destroying the mathematical directness of the earth's pull, as both Prof. Kemper and Prof. Goodenow admit. But it is not here necessary to enter into a further refutation of this assumed acceleration of fall from a fixed tangent. We did this exhaustively last month in reply to Prof. Goodenow, to which we refer the reader.

As we are limited in this reply, that it may appear in the *Standard*, we will devote the remainder of it to a brief statement of the argument which we introduced in the October MICROCOSM upon "*Newton's Oversight*," under the heading of the "Gravitation Controversy," and which will be found thoroughly demonstrated from the *Principia* on another page of this number. Let this oversight be once established and admitted, and, as a matter of course, all controversy about the law of gravity, as formulated by Newton, ends, and his so-called demonstration of the moon's fall from the tanget ingloriously collapses. The oversight we have charged is briefly this: that in calculating the moon's fall from the tangent Newton took only into account the earth's pull of the moon, just as he took into account its pull of a falling pebble at the earth's surface, and totally left out of account the moon's pull of itself from its tangent (by its pull at the earth) *one eightieth* as much as the earth pulls it, and in addition thereto! This self-pull of the moon occurs in consequence of the fact that the moon is *one eightieth* the mass or weight of the earth, and must not only pull at the earth *one eightieth* as much as the earth pulls at the moon (which Newton, of course, recognizes), but it must also pull itself *one eightieth* as much towards the earth as the earth pulls it; while the earth must also pull itself toward the moon *one eightieth* as much as it pulls the moon toward the earth, and in addition to the moon's pull and displacement of the earth one eightieth as much as it displaces itself by attracting the earth. In a word, Newton recognizes the earth's pull of the moon and the moon's reciprocal pull of the earth, both in proportion to mass; but he entirely leaves out the other half of this reciprocal attraction, namely, the fact that the moon actually pulls itself toward the earth, and that the earth actually pulls itself toward the moon in the same reciprocal proportion to mass. As the falling pebble at the earth's surface is infinitesimally small, as compared to the mass of the earth,—not a million millionth,—its self-attraction downward cannot therefore add a million millionth to the earth's pull and its own fall; hence, there can be no mathematical comparison between this unassisted fall of the pebble and the self-assisted fall of the moon which has the whole pull of the earth, the same as the pebble has, and in addition thereto its own pull of itself *one eightieth* more, which Newton totally ignored in his calculations.

The whole question, then, as to the correctness or incorrectness of Newton's law and demonstration, is condensed down into this single nutshell of fact: Did Newton, or did he not, in making his renowned demonstration concerning the moon's fall from the tangent, really leave out this *one eightieth* of the value in the manner we have charged? If he did, then the veriest beginner in science can see that Newton's law of gravitation is fairly overturned, which Prof. Goodenow said would be, if it could be done, "*the most stupendous overturn in science that the world has ever witnessed.*" That it has been overwhelmingly done, and doubly demonstrated from Newton himself in explaining his law, will appear by reference to proofs copied from the *Principia* on another page in reply to Prof. Goodenow, headed "Newton's Great Oversight, No. 2."

Now, the question is, does the Editor of the *Standard* really desire his readers to see the truth upon this matter, as he has all along professed? If so, will he, when he copies this article, either frankly acknowledge to his subscribers that the great law and demonstration of Newton have been fairly broken down, or else refute our charge of oversight of one eightieth of the value by explaining away the proofs we have massed against Newton from the *Principia* elsewhere in this issue of THE MICROCOSM? We pause for his response, and will keep our readers advised as to the result.

Since the foregoing was in type we have received the *Standard* of Nov. 18, containing four columns of reply from Prof. Kemper to our October articles. We will pay our respects to that reply next month to the satisfaction of all concerned, and will only say here that a more pedantic, self-contradictory attempt at ridicule and lack of argument was never perhaps crowded into that same space, as we will abundantly show in our answer. Prof. Kemper may justly be set down as the champion *sneerer*, as well as the champion *pedant* of America, since he pretentiously tries to sneer in *five* different ancient and modern languages as well as in very bad English, in which he unwittingly calls himself a "devil-fish."

A USEFUL LITTLE MACHINE.

Mr. T. Barton Cosley, of 15 Park Place, this city, has presented us with a hand-printing press, self-inking and self-adjusting, in which cards, envelopes, bill-heads, letter-heads, tags, and even small circulars, can be printed with great neatness and facility. An office-boy can do all such printing for a business house in his spare hours, and thus save the cost of the machine and rubber stamps employed, several times a year, if the business is large. The press and outfit of four separate stamps, will be furnished for $12. Our correspondents will see specimens of this work hereafter on our letter-heads, envelopes, etc. This is one of the inventions that has the rare merit of being really useful as well as ornamental, and we are glad to know that Mr. Cosley, the clever inventor, has it well covered by patent. Agents would do well to make a note of this if they wish to sell something that will pay and give satisfaction at the same time.

☞ For items of interest and Terms to Agents for THE MICROCOSM, "*Problem of Human Life*," etc. See last page of cover.

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SOMETHING OUT OF NOTHING.

BY J. W. ROBERTS, ESQ.

The argument that something can be evolved or created out of nothing is not only unscientific, but is absolutely an impossibility, if God is the being He is universally acknowledged to be by all classes of persons who intelligently believe in His existence as an omnipresent substance; for if God fills immensity,—all space,—as is taught and believed by all denominations of Christians of every shade of faith, then there was no spot or corner of space where He was not; and if He was there, then it was utterly impossible for *nothing* to be there also, unless He is nothing in some part of His omnipresent existence; because it is just as impossible for something and nothing to occupy the same space at the same time as for two bodies to achieve that feat. If, therefore, God filled and occupied all space from all eternity, there never has been a place in His vast dominions at any time where nothing was. As God is substance there has never been an inch of His boundless dominion where that substance was not found, and where it did not *fill* what otherwise would have been a void. "Nature hates a vacuum," science avers: and how much less would the Author of Nature be favorable to one?

If this premise be correct, and it really seems to be impregnable in its logical structure,—in fact axiomatic,—then it follows that the notion that God made the world out of nothing is fallacious; and that the Apostle Paul had a better idea of the work of creation when he declared, Rom. i: 20, "For the invisible things of Him from the creation of the world are clearly seen, being understood by the things that are made, even His eternal power and Godhead."

Here the apostle affirms that the "invisible *things* of Him are clearly seen [made manifest] by the things that are made." He does not say the invisible *nothings* are used by God to make the visible things, but *things* or *substance*, teaching clearly to our mind, that God made the things that are visible from things that are not visible, and not from nothing.

And we might add that God's method of procedure is always from the invisible to the visible, both in Nature and grace; but there is not a shadow of evidence anywhere, in Nature or revelation, that He ever invaded the realm of nothing, if such a realm existed or could exist, to hunt up material or substance for any work that He has made.

If, as is universally conceded and unquestionably believed by all intelligent Christians, God occupied *all* space, can it possibly be otherwise than that out of this substance which *fills the universe* that universe must have been brought into existence?

To say that God cannot thus evolve or create from His own substance the visible things of His workmanship, is to limit His power. To say He could not do this, and yet could make a vast universe out of nothing, is irrational in the highest degree.

The objection raised that God cannot thus draw upon His own substance to create material things without exhausting Himself, or tending to that result, is entirely imaginary for several reasons. In the first place the "works of His hands" are in His own dominion and possession, and *never go out of His ownership*. He permeates every atom of matter, even the "small dust of the balance," and the mote, as well as the largest worlds. He, therefore, *loses nothing* at any time or in any place. How, then, while retaining everything, can He exhaust Himself, or in anywise impair His absolute perfection in all things? Surely His wisdom, as well as His power, is able for these things.

But in the second place, the law of recuperation or resupply pervades all nature. The sun is forever shining, and yet is forever supplied with light. He absorbs from the light of the universe as many rays as he sends out from himself. His surface is no larger for throwing off than for taking in; and so the supply and the demand of light at and from him are always equal. The notion that he will exhaust his resources, is a chimera without reason or analogy in Nature. The rains descend from the clouds, are gathered up again in vapor, carried back in clouds, and again fall in showers; so that the springs of water and the thirsty land are fed perpetually. These illustrations could be multiplied almost without limit, but our object now is simply to present the principle.

The same law of absorption prevails in the realm of mind. Men think, and their thoughts become substance which is communicated to other men, and *build them up*. That is, the thought of one man becomes *food* for the mind of other men; and while they *grow* and *develop* on that thought, the *thinker is not exhausted*. He can still use the same thought, and many other thoughts, giving mental food all the time to others, and yet becomes *mentally stronger all the time*. Now how is this, if the substance of his thought going out to build up others exhausts his resources?

Here comes in the great law of compensation. While he gives to others, he is constantly receiving from others. He absorbs from other minds that mental substance, which we may term mind-food; and on this his mental powers are regaled and refreshed, just as others are built up by what he supplies.

How much more infinitely has God the treasuries of strength and knowledge at His disposal than finite man!

No one who believes the Bible will call in question the fact that God "breathed into man's nostrils the breath of life, and man became a living soul." Was that breath of life nothing? or, was it something God imparted from Himself? All intelligent beings receive life from God. Is life nothing? All spiritual beings partake of the nature of God, who is a Spirit. Certainly no one will claim that spirit is nothing. Well, if all spiritual beings on earth, in heaven, and throughout the universe, derive their being from God, did the creation of this innumerable multitude tend to exhaust His resources? Who would think it for a moment?

God's attributes being all absolutely perfect, it is impossible for them or Him to be exhausted or weakened in any direction. But if such a possibility existed, the remedy would be found in the law of re-absortion existing everywhere in Nature, to which we have called attention. If men can build each other up by absorbing each from the other

the needful mental pabulum for this purpose, how much more could God receive to Himself from the intelligent hosts of the universe all that might be required to maintain His supreme perfection? Every thought of every mind goes into His great mind. Every word uttered in all His boundless dominion goes into His ear. There is not a mental effort or emotion in all the universe that He is not absolutely familiar with. If, then, there was any drain made upon His infinite resources—which we do not claim—how easily could the outgo be replaced by these wonderful resources of renewal, if they were required?

But as the universe is still His, no difference in what form it is found, how can He be exhausted by making it? A man can change his possessions from gold to silver or *vice versa*, or into other forms of wealth, and still he is as rich as he was at the beginning. So God can change the form of His possessions, and yet retain every particle of them. Every creature has to receive supplies to replace loss, outside of itself, because it *is* a creature; but God, who retains ownership of everything, no difference in what condition He places it, cannot be exhausted, for *nothing goes from Him*. "In Him we live, and move and have our being," and so lives every created thing, whether in heaven or upon earth.

For these reasons, as well as others that might be added, the theory that by creating the universe out of His own substance, God would exhaust Himself is demonstrated to be fallacious, and to have no solid foundation anywhere; while the doctrine that He made the visible things of creation out of nothing, is not only a scientific absurdity, but a logical impossibility.

DEITY—THE DIVINE SIDE.

BY PROF. I. L. KEPHART, A.M.

Having considered Deity from the human standpoint, and having recognized it as a fact that as truly as "God created man in His own image," so truly does man, by his imagination, create or form God *in his own* image—that is, in accordance with his own appetites, passions and propensities—let us now proceed to consider Deity from the Divine side. But what do we mean, or what are we to understand, by considering Deity from the Divine side? What does it imply? We answer, simply recognizing or taking into account those infinite attributes that necessarily belong to the Creator and upholder of the universe.

Considered from the Divine side, God is an eternal Being. Man is immortal—that is, without end of being; but God is eternal—that is, without beginning or end of being. This must be so from the very nature of things. If He had a beginning, when was it? How was it? What preceded Him in existence? By what agency was He brought into existence? Did He create Himself? The thought is absurd, for He would have first to exist as a Creator in order to create Himself. If created by some other being, how came that being into existence? So we might go on tracing backward without any solution of the question, and without finding any relief for our minds. The only resting place we find is in the Bible declaration: "From everlasting to everlasting, Thou art God." This affords some relief to our finite minds, even though they cannot comprehend the tremendous sweep implied in the idea that God is an eternal, self-existing Being.

God is an Omnipotent, Omnipresent Being; possessing all power, present at all times and in all places. These, too, are words the force of which finite minds cannot comprehend; but we do know that Deity must possess these attributes. His lightnings flash from sky to sky, and His thunderbolts cleave trees and rocks into fragments; His tornadoes strike, as with iron-headed battering-rams, forests and cities, and level them to the ground. His storms uplift the ocean's otherwise placid surface into mountain peaks, and toss proud navies in wrecks upon its shores. His earthquakes convulse, as if in its death-throes, the planet on which we live; and His volcanic eruptions, in a moment, engulf whole cities in one common lake of fire. But these occasional manifestations no more represent God's resistless forces constantly working through all the frame of Nature, than the leakage of a few drops of water, or a little jet of steam, or a feeble hiss of imprisoned air working an air-break, represents the driving, cleaving, or crushing force of all the ponderous machines of human workshops. Thunders, storms, volcanoes, and earthquakes impress our physical senses with an animal fear and dread of God; but the silent, ceaseless order of creation—the ever-present, constantly-working forces of the material universe, appealing to man's reason and judgment, awe him into feelings of reverence and devotion toward the Omnipotent, Omnipresent One. His presence and His power are everywhere manifest, uplifting moisture from the ocean and watering the earth; holding rocks together, and distributing the winds; circulating the sap of growing shrubs and trees throughout the vegetable kingdom, and causing all hearts to throb wherever animal life exists; whirling planets, suns, and systems in their immense orbits, and "tempering the fierce blast to the shorn lamb"; filling with life and joy the millions of human hearts that inhabit our globe, and exhilarating with life and activity the millions of microscopic insects that sport in a dew-drop. Surely nothing short of an Omnipotent, Omnipresent God can do, and ceaselessly continue doing, all these things.

But, when it is asserted that God is all-powerful, that assertion must not be understood as implying that He can do that, the doing of which implies a contradiction or an absurdity. For God to lie, or love sin, or be unjust, is impossible; for it would be in direct conflict with the essential attributes of His being. For God to make a door to be open and shut at the same time, or to revolve a grindstone both ways at the same time, is literally and physically impossible; because it is in direct opposition to the immutable laws and principles of material existence, which He has established. Hence, when it is asserted that, "With God, all things are possible," it must be understood as applying to and embracing only all things that do not necessarily imply an absurdity or conflict with the attributes of His being.

God is Omniscient. He who made everything must certainly know everything he has made. Think of His wisdom and skill, as manifested in material creation. He regulates the beating of an animalcule's pulse; He touches with life the muscles and nerves of the smallest microscopic insect. Must not such wisdom and such skill penetrate to the deepest recesses of human hearts, human thoughts, and human desires? No matter to what heights human thought may ascend, or to what breadth and extent it may travel, there is God, reading those thoughts, noting those desires, recording those volitions. Human thought may

travel to the utmost limit of its finite bounds; but God's thoughts are infinite in extent—they know no limit. On all sides, He is outside of us. Earth, planet, sun, the universe, know no recess, or cavern, or abyss, into which any one of His creatures can secrete itself, and concoct or perpetrate crime, without being viewed by the all-seeing eye. And, on the other hand, no creature or circumstance can erect a barrier high enough, or dense enough, to conceal from His guiding, protecting care, even the weakest and humblest of His confiding followers. In these two thoughts are to be found a terrible warning for the evil doer, and a soul-inspiring assurance for the lover of righteousness. Yes, Deity not only knows our most secret desires and purposes, but He knows the mental and moral habits and forces out of which they spring, and which, by our volitions as free, moral agents, we have originated and developed, and for which He will bring us into judgment. The Omniscient One is too wise to make a mistake.

But as God's being Omnipotent does not imply His ability to do that, the doing of which would involve a moral or a physical absurdity, neither does His being Omniscient, all-wise, imply His ability to know, or His knowing that, the knowing of which would involve an intellectual or psychological absurdity. As God's Omnipotence implies His ability to do all *doable* things, so does His Omniscence imply His ability to know all *knowable* things, as well as His actually knowing all things that do now exist, or have ever existed; but it does not imply that He now knows, and has from all eternity known, as actualities, events which may or may not come to pass in the future, the happening or not happening of which is purely contingent upon the free choices and actions of agencies which, in those respects, He has placed completely beyond His control, and left absolutely free as to the choices they shall make and the acts they shall perform. The failure to recognize this feature of Omniscence has involved theology in a mass of contradictions and absurdities that have driven many into infidelity and even atheism. But a brighter day is dawning.

Of His attributes of justice and mercy, the limits of this article will not permit me to speak. Suffice it to say that, "God is love," and that *love* is the same in all hearts. Consequently, no matter how much men may differ in their opinions of Deity, on this one point they all can unite. Love is the common bond that unites the pure and the good of all climes and worlds into one common brotherhood, and unites them all to the God of the Universe, who *is love*. Love is the sublime, paramount, crowning fact of the Godhead.

BECOMING WISE BY FIRST BECOMING A FOOL.

BY REV. T. WILLISTON, M.A.

There is great significance and depth of meaning in these paradoxical words of Paul, found in 1st Cor. 3, 18: "If any man among you seemeth to be wise in this world, let him become a fool that he may be wise." Literally interpreted, or as the world uses language, it is seemingly absurd to speak of one's becoming a fool in order to be wise; yet, Paul's meaning in the words just quoted is easily discerned. He does in effect say, "There is a kind of wisdom that renders its possessor self-important, and a despiser of the lowly and crucified One, and there is also a wisdom that is infinitely superior to the superficial 'wisdom of this world.' Would you become a possessor of the true wisdom? Become sensible of your own littleness, insignificance, inherent vileness, and entire dependence on divine mercy: cease to be a thankless, prayerless, self-important despiser; get emptied of self, and 'become a fool' in your own esteem, and be willing, if necessary, to be counted a fool by your former associates."

Now, what if Paul, when using such language, had had before him a leader or representative of the various ancient schools of philosophy? What if he had been addressing men renowned as Pythagoras, and Democritus, and Plato, and Aristotle, and Zeno, and Epicurus, and Pyrrho, to say nothing of Diogenes the Cynic, or of the founders of the Middle Academy and the New? Before these founders of more or less famous philosophical schools, these men that in their day were held in such reputation as profound thinkers, would Paul have ventured to say, "O, ye philosophers, and ye that 'seem to be wise in this world,' ye must 'become fools,' and then ye will indeed be wise?" Yes, Paul would have said this even if Socrates himself—the wisest and noblest of the whole philosophical group—had been one of his hearers. In an audience composed of the very wisest of these philosophers, this despised Nazarene, though "rude in speech," and in "bodily presence weak," would, like the son of Kish, have been "higher than any" of his auditors "from his shoulders and upward." Intellectually as well as morally, he was vastly the superior of all these unchristianized thinkers. During Paul's brief stay in Athens —once the intellectual and literary capital of the world—"certain philosophers of the Epicureans and of the Stoics encountered him," and we may be sure that they found "this babbler," as some styled him, a mighty reasoner, an argumentative Samson, whom it was presumptuous for them to encounter.

The arguments that Paul employed in debating with these Epicureans and Stoics are not recorded —though some allusions to their false tenets are made in his noble speech on Mars' hill—but we may imagine him to have addressed, first the Epicureans and then the Stoics, somewhat as follows: "In accounting for the existence of this universe of mind and matter, you Epicureans make Chance the originator, and not an all-wise and ever-existing Mind. You do indeed speak of there being a God (or gods), but if you are right, He neither created the universe, nor does He govern it, or even concern Himself at all in the welfare of the creatures it contains. As you give Him nothing to do, and make him utterly indifferent to human weal or woe, there is nothing for you to worship unless it be Self or Chance. Though marks of intelligence and wise design are visible in every thing around us, yet there was no design, no intelligent forethought in those eternal atoms which, if you are right, after floating fortuitously about in infinite space for thousands of years, and after innumerable collisions and adhesions, separations and combinations, happened at last to so unite and adhere as to become the world we now occupy! Why, brethren, what a stupendous miracle you present us, when you make Accident the constructer of so convenient, well-planned, and wonderful a world as this! It really seems as though those ever-existing atoms you speak of must have possessed the power of thought and contrivance; and yet, if they did, why do not the rocks, and trees and earth, and ocean now think, and now contrive? But you are right in not ascribing intelligence to these eternal atoms; for if

as atoms they had been intelligent contrivers, they could not have lost this power by coming together and forming material bodies. In this system of yours, ye Epicureans, I find another inexplicable tenet. You confess that man has a thinking faculty, a soul; and yet your founder taught, and you believe, that man's thinking soul originated just as did all things else---in the accidental concourse of unintelligent atoms! If the soul's origin be what you make it, it is to me an inexplicable thing how man can think and form plans, when the rocks and trees cannot. And since you hold that the soul is but a collection of material particles—which in some unaccountable way are able to think and reason—and since, moreover, you have no God that interests Himself in human affairs, or that will one day judge the world, it is no wonder that you do not believe in the soul's immortality, or in any life beyond the present. Nor is it any wonder that he from whom you derive your name recommended a virtuous life, and dissuaded from all immortality, not because vice is in itself wrong and offensive to an all-seeing God, but because it renders one *less happy* than a virtuous life would. I am glad that Epicurus counseled his pupils to lead upright and virtuous lives, and that he himself was so exemplary; but ought he not to have had *a higher motive* for the practice of virtue than simply this, that happiness is the fruit of a virtuous life, and unhappiness the legitimate consequence of an immoral one? O, ye Epicureans, must you not, as lovers of wisdom and sensible thinkers, confess that Reason herself pronounces your system to be radically unphilosophical, and even absurd?

"And now, ye disciples of Zeno, permit me to convince you, if possible, that the system you have embraced is chargeable with some very serious and even capital errors. Your views respecting a Deity and the origin of the world are, unlike those of the Epicureans, for the most part correct; only you err, as did Plato and many others, in making *matter* to be like God, underived and eternal. You are right in maintaining that the present order of things is to terminate in a universal conflagration; but you err egregiously in supposing that there is to be, in vast and successive cycles, an endless reproduction and endless overthrow of just such a world as the one we now inhabit. You thus create a sort of hereafter for us mortals, but of how dim, confused, and mistaken your views are in respect to that hereafter, or to man's futurity. You seem to know of no essential difference in the character of men, or in their future destiny; to know of no 'life eternal' for the one class, or 'everlasting punishment' for the other. Your immortality for man consists in his being reunited to (or absorbed in) the Deity at the time of the general conflagration, and then being allowed, as some of you have thought, to re-exist and compose a part, cycle after cycle, of a reproduced universe. Another very serious mistake you make, ye Stoics, consists in your representing all events, not excepting men's actions, as resulting from a blind and irresistible necessity, or fate; a fate from which there is no escape and no appeal. In truth you deify this blind, arbitrary something that you style Necessity, for even your deities are under its inexorable sway. With you the universe is one vast machine presided over and worked, not by an all-wise and holy Mind or Spirit, but by a trumped-up and soulless sovereign denominated Fate. The choices and doings of all rational agents are but parts of this gigantic machine, and the work wrought out is not their work, nor an all-wise God's, but king Fate's! O how unlike is this fatalism of yours to the doctrine —the eternal purpose and foreknowledge of God, combined, and wholly consistent with, absolute freedom of choice on the part of angels and men. If instead of believing in a blind necessity you believed in such a predestination as is taught in the inspired Book, you would not, as you now do, pronounce it a duty or a virtue for one to be indifferent to pain and all things external, nor look with special complacency on one that could endure torture without flinching. Under things afflictive or calamitous the divine oracles would have taught you submission, but not a proud, self-complacent indifference. O ye Stoics and Epicureans, would that I could persuade you to renounce your philosophical delusions, and become the disciples of that Savior whom I love and serve!"

When studied in the light afforded by the Bible and Christianity, how very shallow do the various systems of ancient philosophy appear; how superficial and absurd the speculations of men whom the world once regarded as profound. As we examine their different theories, once so popular but now exploded, what convincing proof we have that "the world by wisdom knew not God." As compared with the Bible and the truths therein developed, the philosophical systems that preceded Christ's advent were darkness itself; and with emphasis may it now be asked, "Hath not God made foolish the wisdom of this world?" Yes, and how true it is that "God hath chosen the foolish things of the world (so esteemed, that is,) to confound the wise." Doubtless, those philosophers that encountered Paul in Athens thought him a fool, and yet that man was rendered a richer blessing to our world than all the so-called philosophers and scientists that have ever lived. Philosophy and science, when christianized, are of immense value; but one had better be Pollok's pious ignoramus, who "never had a dozen thoughts in all his life," than be one that "understands all mysteries and all knowledge," and yet is devoid of that charity (love) that "never faileth," that "seeketh not her own," and "is not puffed up." The word *philosophy* means the love of wisdom; but if it does not include a love of "the wisdom that is from above," what is it but a superficial and profitless philosophy? The word *science* sounds grandly, and charms a great many ears; but pray, what has Science ever enabled the profoundest investigators to find out, except it be a few of the innumerable facts and principles and ideas with which the omniscient Creator has from eternity been familiar? The illustrious Newton was sensible of this, or he would not have said, "I seem, to myself, to be like a child, picking up a shell here and there on the shore of the great ocean of truth." Such an abiding sense had that scientific and Christian philosopher, Robert Boyle, of the Creator's greatness, wisdom, and all-pervading presence and agency, that he never spoke of God, or used His name, without a reverential pause before uttering it. Such scientists and such philosophers as Boyle and Newton—and various others that might be named—are worthy of all honor, and will have praise in heaven. Would that this was true of all the votaries of science and philosophy. What a pity it is that some have with tireless energy and unabated interest subjected all Nature to their scrutiny and research, and yet have utterly failed to "look through Nature up to Nature's God." Believe me, reader, the science that fails to discern any God either in the volume of Nature, or in the world's past and present history, is at the best, sadly de-

fective;—good, perhaps, as far as it goes, but stopping far short of the goal it ought to aim at and reach. There is a "knowledge that puffeth up" its possessor, and leads him into devious paths, far away from the truth. How great, how egregious the folly of those journalists, writers for the press, and publishers, who, while professing to advocate scientific inquiry and free thought, indulge themselves in disparaging and contemptuous remarks respecting the Bible and Christianity. Would, that these and all other skeptics and sneerers were made conscious of their infatuation:—yea more, were made to know, in their own happy experience, the deep significance of the paradox, "Becoming wise by first becoming a fool."

SCIENTISTS AND THEOLOGIANS.

BY PROF. J. U. VINCENT.

We hear much now-a-days about the conflict between scientific truth and religious truth. We have recently heard a popular and powerful pulpit orator assert that, "Current scientific journals and the so-called religio scientific journals are mælstroms of infidelity"—that, "The progressive scientists are laboring to flood the world with infidelity." We have but to take up any religious or respectable journal, to find endless controversies between the constructors of scientific systems and the constructors of theological systems.

Now, there is, there has been, and there can be, no conflict between scientific and religious truths. Honest scientists study the revelations of God in the frame-work of Nature; honest theologians study the revelation of God in the Divine Scriptures. Nature gives the Divine method of science; the Bible gives the Divine method of theology. Between these two plans, and the facts evolved from them, there is no clashing. Both have the same object—God; both read the works of the same author—God; both seek the same light—God. The devotees of science seek the original principle, but the original principle is God; the devotees of theology seek God, but God is the original principle. Science and revelation teach alike, and always the Grand Mosaic story, which, without the support of science, could never be intelligently interpreted, and which might, in time, become a mere mythological fable. Read Nature, or read revelation, we find the same grand, incomprehensible lesson, whose giver is God.

We may philosophize or theologize, in the end God is the basis and the background—simply the all. He is God of the Universe, not by our sufferance, but by His sovereignty. He cannot be volatilized out of it by chemists, nor kept in it by the labors of theologians. Every fact discovered by man has its place in Nature's temple, and no fact can prove fatal to either science or religion.

There are, however, conflicts between the constructors of scientific systems and the constructors of theological systems. But the contradictions arise from the superficiality or ignorance of the constructors. Superficial, bigoted scientists gather a few facts, and syllogize them with the conclusion that they have all the truths discoverable in their line, and with them there is no truth out of their line. Superficial, bigoted theologians glean a few Confessions of Faith—get into certain church channels, catch glimpses of the truth, theorize and colligate a system which, with them, embodies all truth. The former anti theosize the universe, and find a God in an original principle, or in a spontaneous generator, or in a primordial form, or in a self-existing cell; the latter apotheosize their own system, and find a God in the universe by their sufferance, acting by their sufferance, in fact, a God by their sufferance. Both strive to defend their respective systems, while both disregard the Divine system. Both ask not, "Is this true?" but, "Will it do for us to admit this is true?" The scientists say: "This is contrary to our theories therefore it is false." The theologians say: "This is contrary to the tenets and rules of our church, therefore it is false." Both such are charlatans—self-deified bigots shut out from light, and dead to truth. Of course their theories clash.

But it does not follow there is a conflict between scientific truth and religious truth. Honest scientists delve into every inch of Nature's temple, dig out the facts, and announce them without regard to consequences. They walk in no ruts—ride no hobbies. They love truth, seek truth, and accept truth wherever found. They make no fight with God. They ask for facts, and accept facts without considering the effect upon pet dogmas or harmonized creeds, tenets, or gospels. These facts they systematize, and their system is true science.

They transform the deadly earth into glass; if God is mirrored in the glass, they see Him and accept Him; if the tomb of Church Confessions of Faith is mirrored in the glass, they gladly enter the funeral procession, for they know from the tomb of false creeds will spring a grander building of God's Truth.

Of all men it least becomes ministers to charge scientists with infidelity—to berate scientific journals. It is a historical fact that scientists are the strongest pillars of the Christian pulpit. When her inmost citadels are invaded, scientists, with truth piled upon truth, delved from the deep sea or bowels of the earth, extracted from the bark or root, the flower or fruit of the forest or field, or snatched from the air and sunlight, come to the rescue, and convert fearful defeat into triumphant victory. This pulpit detraction and alarm is so puerile and despicable that it brands its authors as superficial bigots.

Jonesboro, Texas.

BARALOGY.

BY G. L. WILSON.

The subject of Baralogy, or creation, as taught in the Hebrew Genesis, has been the cause of much contention between science and religion; but to claim that baralogy and geology are in conflict, is a mental myopy; since, in order to prove such a conflict, one must needs assume to know everything concerning both, as single and relative items.

The Hebrew word *bara*, the second word in the first chapter of Genesis, which is translated *create* in several places in King James' translation, is a word which, if not so specific as to always prove substantialism, is at least so generic as to include it to the exclusion of specific spiritualism or materialism.

To prove this, let us cite a few texts where this word appears. In the first place, we have the statement that, "God created (*bara*) the heaven and the earth." Advanced philology will bear upon this text more favorably than at present.

We know of none who attribute to man the power of making *something of nothing*; but we find (Ezek. xxi: 19) that God told Ezekiel to create (*bara*,

translated *choose*) a place. This does not imply that God had forgotten to make this place *out of nothing*, during the first six periods of creation. We also find (Josh. xvii: 15, 18) Joshua commanding the "children of Joseph" to create (*bara*, translated *cut down*) a land for themselves—surely not *out of nothing*.

Other versions favor substantialism. In Genesis of the Septuagint, the Greek word *poieo* is used in place of the Hebrew *bara* to designate *create*. This Greek word is probably the basis of the old French word *apointer*, to prepare or arrange; also of the English word *appoint*, as indicated in the text (Prov. viii: 29), "He appointed the foundations of the earth." This word, *poieo* appears (Matt. iii: 8, *et seg.*, as *bring*) in the critical Text of Tischendorf, Greenfield, *et al.*, and is translated into the accepted Latin, Codex Beza, the Vulgate, and Mortin's French Text, as *make* or *prepare*, while the accepted German gives it as *make appear*. Are we commanded therein to create something out of nothing? or, to bring forth that energy of soul which is already in us?

We know (Heb. xi: 3) that, "Things which are seen were not made of things which do appear"; but that, as some versions render this text, "From the invisible the visible was made."

We find, 1, That the word *create* does not mean to make out of *nothing*; 2, That it was used to denote a making "from the invisible"; therefore, 3, That it must have been from an invisible something—from substantial essence without attribute, the combination of essence and attribute as matter was made to appear.

CENTER POINT, IOWA.

ELECTRICITY THE MOTOR POWER OF THE SOLAR SYSTEM.—NO. VI.

BY B. T. KAVANAUGH, M.D., D.D.

THE SUN THE SOURCE OF POSITIVE ELECTRICITY.

(*Continued.*)

It would doubtless appear to many a work of supererogation to undertake to prove that the sun is the source of positive electricity. It is, nevertheless, true that there are some learned professors, gravitationists, holding high positions in the scholastic world, who have undertaken to show that the electricity for which we here contend, is generated in the atmosphere by some undefined process of friction. Others, as Prof. Ellis of Philadelphia, would have us believe it is produced by the evaporation of the waters of the ocean. These, and many other speculative philosophers, create the necessity of giving to the subject a more critical examination than heretofore, which is attempted in this article.

That the sun is the source of positive electricity is susceptible of demonstration from many considerations, from which I select a few:

1. The facts and positions set forth in my five preceding articles are based upon the attracting and repelling forces of electricity derived from the sun. If my doctrines and deductions as found in these articles are correct, and the sun does perform the offices therein ascribed to it, then the conclusion is inevitable that the source of power is derived from the sun. To which I add the following:

2. In regard to the rays of the sun, it must be remembered that all true electricians hold that, in every solar ray, there is a combination of light, heat, and electricity—three distinct elements; that these elements or properties are resolvable, one into the other; and that they act conjointly or separately as conditions may demand, or circumstances require. In proof of this, try the following simple experiment:

Take a sun-glass—a double convex lens of 3-inch diameter—and so hold it as to pass the rays of the sun through it and converge them into a focal point, and place a piece of charcoal in the focus, when it will be ignited at once. If you then take a small silver wire, whether five, or five hundred feet long, it matters not, so both extremities are before you, with a ball on the near or handle end and the other end pointed; then lay the wire near the ball in the burning focus and sparks of electricity will pass off from the pointed end. Here, then, you have light, heat, and electricity all under the eye at the same time; one converted into the other, and all proceeding from the sun. If you doubt this, place your eye in the focal point and look through the lens at the sun, and doubt will be at an end.

We here ask special attention to three facts: 1, that the rays were manifested as light only, before they reached the lens and after passing through it until they reach the focal point; where—2, all the light is converted into heat, and here you have heat only so far as external appearances are manifest; but again—3, this heat passes off into electricity proper, as is evident from its action through the wire, and here again we have light in the emitted sparks. These facts are to be remembered when we speak of the action of electricity.

If the few solar rays that find a passage through a lens of three inches in diameter, are found to produce such magic results, what may we not expect from the floods of light in which whole hemispheres are bathed? They certainly guarantee enough substantial force to arm the monarch of the solar system with sufficient power to control the action of every planet in his realm, and to stimulate and perpetuate the current of life in the vegetable and animal kingdoms.

3. The same facts are sustained by the following process in Nature: The rays of light emanating from the sun, on their passage to the earth are often intercepted by two or more strata of clouds, one above another. If the upper cloud wholly overshadows the underlying one, it receives all the rays of the sun, in which case, the light is converted into heat and electricity until it becomes so heavily charged that it seeks a communication with the cloud below; which being negative as compared with the upper, has a strong affinity for, and is drawn towards it. If the two do not approach sufficiently near to produce a direct discharge, they often, by the mutual action of the positive cloud above, and the negative below, form connection by establishing a magnetic line of oxygen or hydrogen gas around which, in a spiral form, the upper cloud discharges so much of its electricity as to establish an electric equilibrium between them. The spiral line seen at a distance presents the appearance of a zigzag current. If the upper cloud still accumulates a heavier charge from the sun, it may repeat its discharge many times to the cloud below. When the underlying cloud is heavily charged from its neighbor above, it seeks a communication with the earth by which to discharge itself.

It is an invariable law that when clouds become heavily charged with positive electricity from the sun, that they superinduce a great concentration of negative electricity on that part of the earth nearest the cloud. In some instances, according to the

observations of Prof. Tice, in damp, warm weather, the negative electricity may be seen at night dancing and glimmering with a bluish, white light, upon high points in the direction of the heavily-charged cloud above. In some instances, the cloud may pass low enough to discharge itself upon mountain tops, or by striking the tops of tall trees or other objects, which, the fluid follows as a conductor to a point near the ground where it comes in contact with the negative electricity of the earth, and is neutralized by it. Positive electricity never enters the earth. Where two or more clouds near the same plane of elevation are well and equally charged with positive electricity, they mutually repel each other and are thereby distributed over a larger area of country. The economy of the equitable distribution of rain-clouds is subject to electric agency. Over this matter gravitation has no influence whatever. In the absence of this distributive force waterspouts would be of constant occurrence.

It is sometimes the case that the accumulated negative electricity on the earth becomes more dynamic, or active, than the positive in the cloud with which it seeks connection. In this case, a magnetic line of gas is formed between the earth and the cloud, and there is a discharge of the negative electricity upward, in which case the positive electricity of the cloud is neutralized and thereby robbed of its energy. Where the negative is the dynamic or active force, it bears the appearance of a bluish-white light; whereas, the positive, descending to lower clouds, or to the earth, presents the appearance of a reddish-white light. It is presumed from the above considerations that no reflecting mind should hesitate to believe that the sun is the source of positive electricity. That there are two kinds of electricity, as heretofore stated, one, native to the earth—the negative; and the other—the positive—derived from the sun, is evident both from the colors they present, and the direction of their action.

The joint agency of the solar and terrestrial electricity in giving fruitfulness to the earth, germination to seeds, and vitality, health and development to the animal and vegetable kingdoms, will be reserved for consideration in some future number.

MT. STERLING, Ky.

EQUIPOISE IN THE TRUE PHILOSOPHER.

BY REV. J. I. SWANDER, A. M.

It must be evident to the apt student of the history of philosophy, that the tendency in many of the world's advanced thinkers has been toward some one-sided position, in which it was not possible to hold more than a fraction of the whole truth. For this reason the leading intellects, even in those ages most favorable to high attainments, have not been able to supply the world with a satisfactory solution of its most momentous problems. We may begin our observations with the water cosmogony of Thales, or start with the Pythagorean dream of an eternal quantitative proportion, and follow the winding stream of speculative inquiry to its latest phase in modern materialism, and we shall see the truth of the above assertion demonstrated in the constant ebbs and flows of the world's philosophical tide. Stoicism and Epicurianism occupy opposite banks upon which they have been thrown by the side-push of mutual repulsion, as well as the swelling current of a central truth. Nominalism and realism are antagonistic in principle, while each one is the progeny of the other. Indeed, when we study the genealogical record of isms, we find that each successive generation took a new line of departure. Platonism gave birth to a large family, but left no child to follow in the exact footsteps of the illustrious parent. The dry distinctions of scholastic philosophy created a demand for something different. Cartesionism started in doubt, and passed over to the sensationalism of Locke; then, by a reactionary side-push passed back to the skepticism of Berkley and Hume; thence, again, it rebounded and passed, by the way of German idealism, back into that materialism which is now cursing the continent of Europe. This materialistic evolution is in turn the starting point from which Spencer, Tyndall and others speculate themselves into the theory of the mere phenomenal existence of the human soul. Thus has the zigzag movement of restless inquiry come blundering down the ages, until it culminated in a questionable something, calling itself Agnosticism—the most consistent term in the whole vocabulary of scientific infidelity.

When this point was reached, the world was ready for something better. The fullness of the time had come for a positive philosophy involving elements in common with much that had gone before, and, at the same time, something radically different from anything previously offered upon the altar of science. There was a loud call for the coming man. The nature of the position to be filled indicated the necessary qualifications on the part of the proper respondent. There was war to wage. The right man girded himself for the attack, and stepped into the arena of battle. His eminent fitness for the responsibility of the undertaking appeared most clearly in his ability to balance himself between the counter-pulls and pushes of competitive theories. Dr. Hall has met the enemy, and their scalps are strung upon his belt. His startling "*Problem of Human Life*" has raised a reasonable expectation of better things to come. It is even admitted, by many who dissent from some of his views, that he is making a valuable contribution toward the analysis and explanation of certain newly-discovered factors and forces in Nature. Intense anxiety fills the minds of millions. They are dissatisfied with the old, and yet look with suspicion upon the new. Some of his admiring disciples follow him afar off. They are waiting for further testimony. It is feared that his recently projected hypotheses are nothing more than beautiful dreams floating in the transient exuberance of chimerical speculation; that the new philosophy, around which so many hopes are clustered, will prove to be but an "ill-guided bark, well-built and tall, for angry waves to cast on desert shore." The writer of this article is of the opinion that there is no occasion for any such gloomy forebodings. The great work which Wilford Hall has undertaken, will succeed. The assurance of such success is found, not so much in his remarkable powers of intellect, as in his happy combination of *three distinct and inseparable elements of strength*—central position, Christian impulse, and conservative progress.

1. *His position is central.*—For this reason it is impossible for him to fall into fundamental error, except through illogical reasoning. He holds that mind and matter have the same origin in the very substantial fulness of the Infinite God; that they are produced by a process of "condensation," rather than by evolution, as taught by Rev. Joseph Cook

and others; that they are distinct in their essential elements and properties; that man, as the microcosm of Nature, consists of a dual structure; and that the human soul, though invisible in the hemisphere of materiality, is nevertheless, a substantial organic entity. Starting from this central point, he can sail up the main channel of truth, between bold materialism on the one hand, and bald idealism on the other, without necessarily nearing the dangers to which the philosophical mariner is usually exposed. True, he has been charged with materialistic tendencies. The third chapter of the *Problem* contains a few specimens of an attempted side-push. 'Certain parties, whose cosmogony is predicated of "nothing," undertook to drive him into the meshes of materialism, and, in return, received such a counter-push from the Gibraltral centre of truth as to send them reeling back to —"nothing"—the convenient starting point for men who deny that they are the "offspring of God" (Acts xvii : 29), and who have no other material from which to manufacture their orthodox theory of cosmogonal nonsense.

Having failed to show that the author is a materialist, a new count was thrust into the indictment. "Pantheism" is the grave charge laid at the door of 23 Park Row, New York City. Dr. Hall a pantheist? Indeed! Let us look a little at the ground of this serious accusation. While he proclaims the substantial fullness of God as the source of all things, he also insists that God's immanent presence is the motor power in the life of the universe. He also insists that a recognition of the dual structure of man, as the microcosmic culmination of Nature, is the only royal road of escape from that old heresy of dualism in philosophy which was hatched from the false conception of two primordial principles, and, consequently, two adverse elements—mind and matter—in eternal conflict. Spinoza sought to destroy this false dualism, but failed to distinguish clearly between the corporeal and incorporeal entities of the universe; hence, he fell, with all his masterly powers, into the vortex of pantheism. His God was consubstantially one with the world. This is just what Wilford Hall does *not* teach. He consistently and constantly holds and proclaims that God was before creation, is above creation, and ever shall remain distinct therefrom. If Dr. Hall is a pantheist, the American woods are full of them, and the Christian Church is steeped with the very essence of this most biblical heresy. But it is *not* pantheism; and those who are trying to kindle their censorial fires to burn such heretics, had better save their fuel to thaw the frigidity out of their own iceberg orthodoxy.

2. His impulses are positively *Christian*. He is not moved by the mere conviction that there is a personal God, but also, and rather, by a sense of His theanthropic nearness in the person of the Christ who spake to science, as well as to the Church:—"Ye believe in God; believe also in *Me*." Through such faith the Christian philosopher understands that the worlds were framed. Occupying this position, and actuated by such impulse, he is able to hold religion and science in their proper relation to each other, as correlative factors, in the solution of the problems which neither one could solve without the other. Dr. Hall proposes to keep it before the people that religion is destined to become incarnate in true science; that the mutual paths of their progress are onward and upward; that religion enlightens science, and lifts it out of rationalism; that science stimulates religion, and leads it out of superstition; that they thus move mutually on, in converging lines, toward that desirable and attainable point in history, when the two shall be glorified together, and the temple of truth, in all the beauty of its symmetrical proportions, shall rear its towering steeple above the dark domes of delusion and death; and, in the radiance of its electric light, enable both the Christian and the philosopher to write their names, in characters immortal, upon the parchment of the brightening skies, and step to their reward in heaven.

3. His progress is *conservative*. While he is unwilling to don the diminutive straight-jacket of scholastic confessionalism, and hamper the native powers of his intellect by allowing others to become the creators of his thoughts and custodians of his conscience, he uncovers his head with reverence before the creeds and theories of the past, and learns lessons of wisdom through the formulations of other ages. He belongs to the human race, and has neither right nor desire to tear himself from it. He is controlled by the centripetal power of obviously established theories, and, at the same time, carried forward by the centrifugal force of legitimate inquiry and progress. He is free to be bound by all truth, and bound to be free from all falsehood. Dr. Hall is radically conservative. He has not assailed the Newtonian theory of gravitation, as a whole, but only in those parts which appear to him manifestly defective. The result of his persistent battering is variously estimated. Many mathematicians have been convinced that the "*Principia*" should be closed for repairs. Wilford's assault upon the wave-theory of sound is different. He spared but little, because there was but little of value to save. The theory is radically wrong, and required a radical treatment. He struck at the very foundation of the popular fallacy; and as the false temple totters before the telling blows of truth, our most orthodox beaver goes sailing into the air in token of our admiration for the man whom the people delight to honor.

REDEMPTION.

FROM A SEMI-RELIGIO-PHILOSOPHICAL STANDPOINT.

BY ELD. J. G. BURROUGHS.

The physical universe abounds with a multitudinous variety of evidences of the pre-existence of a Designer. Around us, beneath us, above us; in solids and fluids; in ponderable and imponderable substances; in all matter—gross and refined, visible and invisible—evidences, innumerable, obtain. It is impossible for us to conceive of a design without a de-signer—an effect without a cause, and, *vice versa*, a cause without a corresponding effect.

Nothing comes by chance. Chance is a nonentity. It is absurd, therefore, to assert the origin of something from a non-existent.

The universe exists. This cannot be denied. The beginning and duration of its existence, and, the manner of its origin, may be asserted and discussed; but, the *fact* that it exists, never.

The universe is a triality—a three-fold existent—life, mind, matter. This triality is co-existent, but not co-equal; co-eternal, but not co-extensive; co-etistent, but not co-omnipotent, co-omnipresent, or, co-omnicient.

Matter is susceptible of organization; life is not. Organization of matter, therefore, is dependent on *life*, and not *life* on organization of matter. Life is, therefore, the *cause* of organization. Without life, *such* an effect could not obtain.

In the creative, or formative, period of the physical universe, a triality of intelligent existences appeared upon the scene of action. This triality of intelligences became a trinity of causes in the formation and organization of matter—visible and *in*visible—as it now obtains in the broad expanse of space.

This grand Trinity of causes, in the formation and organization of matter, is introduced to us by the terms *Theos*, *Logos*, and *Pneumatos*,—God, Word, Spirit. Hence, we learn, early, in our study of matter, to call this trinity of causes by name. *In* them we see life, mind, motion, and the three resultant effects—knowledge, wisdom, power.

The universe of matter is formed of dualities and trialities. *Man* is, therefore, a triality—a triality of parts—body, soul, spirit. The body is of the earth, earthy. The soul is the *animus*—animal, or natural life—of the body. The *pneuma*, or spirit, is the ever-living and thinking entity. The *soma*, or body, is the outer-court. The soul is the inner court, or sanctum, of the spirit—the man proper.

This triality of parts does not end here; but it obtains with the *body* of man, as well, and, with all *plants*. In the *plant* we have the root, the stem, the branch. We have, also, the leaf, the bud, the fruit. We have, also, the three essentials to growth, or development, viz: Earth, light, moisture.

Everywhere, in this stupendous universe, we see duality and triality obtaining. This speaks volumes. The law of duality and triality is so universal that it utterly precludes the idea of chance or accident.

This two-fold and three-fold nature of things does not obtain in the physical system only; but, it also obtains in the great moral system. The same Trinity of Causes that appeared in the formative period of the physical system, appeared also in the formative stage of the system of Redemption. But they were introduced in a somewhat different relation—the relation of Father, Son and Holy Spirit.

Redemption was not a matter of grave necessity. Deity was under no obligations, whatever, to man that He should redeem him. The system of moral redemption was, therefore, simply an outgrowth of divine love (John iii: 16), love unbounded, unfeigned, and unrestricted toward any class, rank, color, or condition of men, (Heb. ii: 9.). But, whilst it is true that the system of redemption was not a matter of necessity, but of love, it is also true that, when it was determined upon, it became necessary, in order to inaugurate it, that,

I.—The *Logos*, or Word, should come.

II.—That He should be "made flesh."

III.—That He should suffer.

This triality of necessities is explainable by a trialism of trialities. It was needful that the Word should come, because

I.—There was no other intelligence in the universe that fully represented the attributes of Diety.

II.—*By* Him God had made the worlds. "*By* Him, and *for* Him, all things were made that were made."

III.—Because He was the power of God, and the wisdom of God, (1 Cor. i: 24,) that is, He was the manifestation of the power and wisdom of God.

It was necessary that He should be made flesh, because

I.—"The children" (of men) "are partakers of flesh and blood." (Heb. ii: 14.)

II.—"That He might be a merciful and faithful High Priest in things pertaining to God." (Heb. ii: 17.)

III.—That "being tempted He might be able to help them that are tempted." (Heb. ii: 18.)

It behooved Him to suffer;

I.—That He might make an atonement for sin. (Heb. ii: 17.)

II.—"That through death He might destroy Him that had the power of death, that is, the devil." (Heb. ii: 14.)

III.—That "He might lead captivity captive and give gifts to men." (Eph. iv: 8.)

This last trialism begat the necessity of another, viz:

I.—His death.

II.—His burial.

III.—His resurrection.

The term redemption gives the idea of something to be redeemed. In moral redemption *man* is that something. In redeeming anything we must always give an equivalent. Anything of less value will fail of the desired object. If there is any difference, therefore, in the value of the thing redeemed and that given in redemption, the greater value must attach to the thing given in redemption. *Illustration*: Greenback, and all paper money, is made redeemable in coin. This coin may be silver or gold. The paper has no intrinsic value of its own; it is made valuable, only, by virtue of the commercial value stamped upon its face. The coin, given in redemption, has not only this *commercial* value, but, it has, also, an *intrinsic* value of its own. Hence, when given in redemption it becomes more than an equivalent to the thing redeemed.

The Pauline theology teaches us that it was impossible that "the blood of bulls and of goats should take away sin." (Heb. x: 4.) In other words, it was impossible for the blood of these animals to redeem from sin. Why? Because the thing offered was inferior in value to the thing to be redeemed. Had it been possible for the blood of these animals to remove sin there would have been no necessity for the coming and incarnation of the *Logos*, or Word. All the ages, prior to the coming of the *Logos*, were pictorial ages. God taught man in these ages, by a manifold series of pictures. The various sacrifical offerings were, therefore, only a series of these pictures, or types—bringing to remembrance the sins of the people As *pictures* they brought to remembrance the transgressions and iniquities of the people. As *types* they pointed to the coming of the Lamb of God that should take away the sins of the world. The simplicity of the teaching shows the necessity of the pictorial system.

The law of redemption, then, requiring an equivalent, made it necessary that man should suffer for man. Hence, when the *Logos* came into the world, addressing the Father, He said: "Sacrifice and offering Thou wouldest not, but a *body* hast Thou prepared Me." (Heb. x: 5.) Hence, "He took not on Him the nature of angels." For, if He had, He could not have suffered. Neither did He take on Him the nature of any of the animal kind, for reasons before assigned. "But, He took on Him the seed of Abraham"—that is, the *nature* of the seed of Abraham—which was human. (Heb. ii: 16.) Having taken on Him the nature of the seed of Abraham He became man; and hence, as man, could give the required equivalent in redemption. In Him, therefore, we beheld a dual, or two-fold, nature, viz:

I.—The Divine. II.—The huma

In His *humanity* He gave an equivalent for man. In His *Divinity* He gave more than an equivalent. Thus, in the fullest sense of the word He became our Redeemer; our Saviour; our Priest; our King; our Law-Giver; our Lord; our Judge; our Friend; our Brother. Having become one of us, by the ties of Nature, He can sympathize with us in the cares and vicisitudes of life; and, having "suffered being tempted. He is able to succor them that are tempted," (Heb. ii: 18.)

(*To be concluded next month.*)

THE INTERMEDIATE STATE VERSUS MATERIALISM.

J. W. LOWBER, M. A., Ph. D.

The intermediate state denotes the condition of man between death and the resurrection. Paul prayed that the whole spirit, soul and body, be preserved blameless until the coming of Christ. (1 Thess. v : 23). This clearly teaches that man is a trinity, consisting of spirit, soul and body. Our Lord has taught us not to fear him who can kill only the body; but rather fear Him who can destroy both soul and body in hell. (Matt. x : 28). The Sadducees were materialists, and did not believe in the resurrection. They, like modern materialists, considered themselves invincible in argument, and they frequently had discussions with the Pharisees—their opponents. On one occasion, when Jesus had silenced the Pharisees they came with their favorite question. He soon answered them; and then presented an argument which reduced them to complete quiescence. He insisted that the dead are raised—from the fact, that Moses at the bush called the Lord "the God of Abraham, the God of Isaac, and the God of Jacob," (Lev. xx: 37, 38). He is not the God of the dead, but of the living; for all live unto Him. Abraham, Isaac, and Jacob had been dead several centuries, yet they were alive unto God.

On the sublime occasion of the transfiguration of Christ, there were representatives from the present state, from the intermediate, and from the eternal. Peter, James, and John were from the present state; Moses from the intermediate; and Elijah from the eternal. The apostles would afterwards refer to this occasion, and say "we were witnesses of His majesty." On the holy mount they heard God acknowledge the authority of His Son, whom they were commanded to obey, (Matt. xvii; and 2 Peter i: 17).

We read in the Bible of the outward man and the inward man; and Paul says, "though the outward man perish, the inward man is renewed day by day," (2 Cor. iv: 16). As the outward man is the counterpart of the inward man, we must conclude that the inward man is a conscious entity, which will remain conscious after death; for when the outward man perishes, it is renewed. That there can be consciousness out of the body is clearly taught by Paul in 2 Cor. xii: 2-4. This language clearly teaches the following facts:

1. That the man of whom Paul speaks was not the body, but dwelt in the body. 2. That the man could have been caught away to paradise in the body. 3. That the man could have been caught away to paradise out of the body. 4. That man could hear unspeakable things out of the body as well as in it.

The parable of the rich man and Lazarus very plainly teaches the conscious existence of man between death and the resurrection, (Luke xvi: 19-31). It is claimed by the materialist that this parable has reference to the Jews and Gentiles. This cannot be, for the following reasons: 1. Both the rich man and Lazarus died; so the scene is placed in death. If Lazarus represents the conversion of the Gentiles, he should have passed from death to life instead of passing from life to death. 2. If death in the case of Lazarus means conversion, it means the same in the case of the rich man; for he died also, *i.e.*, in like manner. To whom was he converted. 3. There was a great gulf fixed between the parties, so that passage to and fro was impossible. The wall of partition between the Jews and Gentiles was taken down. 4. Under the Gospel there is no difference between Jews and Gentiles, (Acts xv: 8, 9); so the parable cannot denote simply the condition of the Jews and Gentiles. 5. If the rich man represents the whole house of Israel, what is meant by the language, "my father's house." 6. Who was his father? It could not have been Abraham; for he said, "Father Abraham, send Lazarus to my father's house." The Jews always called Abraham father, but this man also called another father; so he could not have represented simply the Jewish nation. 7. The rich man could not have represented the whole house of Israel; for he had five brethren at home, at his father's house. 8. The Jews and Gentiles as such cannot be indicated in the parable, for the Jews never called the Gentiles brethren. The scene in the parable is laid in the realms of death, and the condition of man after death is clearly indicated.

The three Greek words, *tartarus*, *hades* and *gehenna* are represented in the Bible by the one English word *hell*. The word *gehenna* alone denoted the receptacle of the wicked after the resurrection. *Hades* simply denotes the unseen, and includes *tartarus* and *paradise*. The rich man was in *tartarus*, but Lazarus was in *paradise*. At the judgment *hades* will be destroyed, and the wicked consigned to a place of endless doom. "Death and hades were cast into the lake of fire. This is the second death." (Rev. xx : 14).

LANCASTER, Ky.

LIFE.

BY REV. THOS. NIELD.

Creation, seen in its immensity,
Has symmetry and oneness. 'Tis a thought
Of His whose presence fills infinity—
A thought elaborated into form.
This unity consists of unities,
And each of these includes a manifold
Diversity. The constellations, suns,
Moons, planets, stars, are one great truncal branch
Of branches with their glittering leaves, alike
Yet limitless in their variety.
And earth is one, yet many unities,
As a ship's cable is a rope of ropes.
Its inorganic forms are unities
That grade from mountains to their molecules.
The vegetable structures have their types
Diverging from generic archetypes.
And so the structures of all conscious things
From vertebrate to animalcule.
And so complete the spheric concept of
The Infinite that these are analogues
Of life, that has its ganglionic types
The parts of one neurotic unity.
The alchemy of vegetable life
Is such that it manipulates the gross
And inorganic elements of earth,

Transmuting them by occult energy
To royalty of beauty in the rose
And royal substance in the edible,
Endowed with duplicative attributes.
Generic matter differentiates,
Inertia moves, death finds a way to life,
And what was one is multifarious.
Yet e'en the life-force is generic thus:
Whate'er it forms has vegetable life;—
Specific thus: it has its types of life.
The primal substance is alike in all,
And then diverse in each; and most diverse
When differentiated to its kind.
And 'tis the life-force that imparts to it
The differentiating impetus.
And vegetable life has analogues.
The animal has typic life-force as
Its typic forms. A cow and sheep eat grass
When lo, this bears a lamb and that a calf.
Generic substance is specific now.
So near generic in their first remove,
By gradual steps the differentiate
And drop generic for specific traits
By the determinating force of life,
Until the individual bleats or blares.
So man, who gains earth's highest round of life,
Is in generic sameness at the base;
And then, in life's initial progress, but
An indistinguishable ovule that
Reveals no differentiating key
With which to enter into life. Nor strange
That life, which hides when robed in full attire,
Should shun our gaze in this its privacy.
Nor strange its first diverging steps toward its
Specific goal should find it *nearer* the
Generic type, with "gills" and "little tail,"
And *further* as it differentiates
Toward individuality.
But what
Is life? The ultimate analysis
Of causal energy onmoving toward
An end,—an energy that works through some
Substantiality in subtlest guise.
In vegetable, it is vital force,—
The simplest form in which Omnipotence
In Nature manifests his energy.
In animal, it is a higher form,
More complex in its energy, with a
Mentality that acts as governor.
In man, it is a kindred basic force
Of animal vitality which bows
To the sublimest intellect that finds
Enshrinement in a perishable form,—
An intellect uplifted mountain-like,
Irradiant with a spiritual glow
From out the orient of the Infinite.
Mentality is more than vital force,
And spirit than a bare mentality.
And hence, life's lowest forms have lowest laws;
Its higher forms a rising grade of law.
And what is highest in the scale of life
Is monarch of the realm where it resides.
Ask how the mind enforces its behests?
The mental entity, which is the man
Within his temporary tenement,
Transmits his miniatured mentality
In a substantial germ of energy
To its receptacle—a lifeless cell—
The crude material of its tenement.
And there the tenant fashions his abode
Appropriating its resources to
His needs as guided by the genius of
The supervising mind—its deity
Who holds the scales of destiny. And so,
At length, this mental duplicate completes
Its duplication of the tenement
That served the purpose of the entities
It duplicates. And such, indeed, is life
That everything adapts its aliment
To its development, beginning with
Its corner-stone of needs and building to
Its cope; for adaptation is the law
Of life. Then how the strange abnormities
So unadapted to the tenant's needs?
A shock to the supreme mentality
May leave concussive traces of effect
On the dependent organism on
The road to independent being. The
Constructive impulse of the fetus while
Engaged in its upbuilding processes
Receives this bias from abnormal moods
Of the maternal architect, and so
Materializes the abnormities
Of her mentality by sympathy
And adaptation to fictitious needs.
But more susceptible the germ when in
The vestibule of its organic life;
More plastic to the mental touch of the
Determinating entity; more quick
In its responses to her impulses;
More fundamental the abnormities.
Thus Nature's law adapting means to ends
By misconstruction is unnatural,
And so its verdicts are abnormities.
Four Cherubims within life's eastern gate—
The side whence comes the dawn—are placed to guard
The tree of life with flaming swords of law.
The first asks structural affinity
And mental likeness ere one hybrid step
Can touch the threshold of specific kind.
The next forbids a dual unity,
Or a specific no-species from two,
To enter and partake the mystic fruit.
The neat demands that species least allied
Halt soonest nor approach within sword's length.
Those most allied may step within the gate,
Yet not advance beyond and eat and live.
The last invites to drop duality
By merging into the original,
And by repentance enter into life,
And then rewards conformity to law.
Thus, then, we see that species most allied
Have typical resemblances enough
To make their organisms coalesce,
But lack the homologic quality
To make a unit of the dual mind
And posit individuality.
How? The determining mentality
Lacks homogeneousness to concentrate
Its force as a determinant. It is
A kingdom that divides against itself.
Conflicting forces will not let it stand.
And thus the gate of life is safely kept,
And God insures eternal harmony.
Away the idiot's dream that seeks to rob
Creation of her laws and make her works
So many nothingnesses entitized,—
As things evolved that never were involved.
The oneness of the grand stupendous whole
Implies the oneness of a moulding mind,
All-wise, almighty, and unchangable.

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IS MAN'S PHYSICAL NATURE AN EVOLUTION FROM THE LOWER ANIMALS?—No. 1.

BY REV. JOS. S. VAN DYKE.

How does the theory of evolution stand related to the origin of man's physical nature? Does it furnish a satisfactory answer to the question, Whence came the human body? Is this garment of the soul the result of an evolution from less complex organism?

Weak elsewhere, the theory is a conspicuous failure when it essays the task of explaining man's origin. To affirm that the human family, a new species, has been developed by the tranmutation of previously existing species, appears like an infelicitous mode of expression, it being difficult to assign any reason why the term *species* should be employed: since, if the hypothesis be true, it is apparently impossible to determine when the manifestation of the old specific form ceased and that of the new began. Why say, "Man's progenitor was some species of monkey," if the latter by insensible gradations glided into the former? This seems to destroy the idea of species. If the changes pertain to individuals, they cannot be considered as proving the mutation of species.

Admitting that by care in the selection of individuals, a few more feathers can be developed in the tail of a pigeon, as Darwin succeeded in producing, may we not ask, does this prove that the pigeon owes its origin to some lower organism? Conceding that the lion has been slightly improved during the last two or three thousand years, by the survival of the fittest or by the inherent power of species, is he not a lion still? Granted that mackeral have become larger and better adapted to wage warfare with their enemies, does this furnish any evidence that they were evolved from an inferior organism?—or, that they will eventually develop a new and improved organic form?

If species are mutable, why do we fail in discovering evidences that slight permanent changes have taken place during the period covered by history? The bee has been industriously engaged in extracting sweetness from flowers since the days of Aristotle. The ant ever since Solomon recommended its example to the sluggard, has been practicing building and hoarding provisions against a time of need. There is no evidence that either has acquired a single new organ, or has more perfectly developed organs previously possessed in rudementary form, or has unfolded new instincts from potential germs. Egypt, in its mummies as well as in its paintings, has preserved for us a museum of natural history whose specimens were collected thirty centuries ago; and yet in no respect do they differ from species now existing.

We are asked to believe that the ape-tribe developed new organs, highly intellectual faculties and even moral perceptions; and yet, though man has been striving after new powers for thousands of years, there is no evidence that he has acquired new faculties, or developed new organs; not one single channel has been opened, no new perception has been gained, not one of the five senses has become more extended in its range, though some animals have a sense not possessed by man; nay, even the simial family has lost the power of improvement, having remained stationary for the last thirty centuries. Add to this the fact that there is abundant evidence that all organisms have remained substantially the same since the earliest historical periods, and it seems incredible that the gorilla should be the ancestor of the human family.

It is assumed that the ape-family, and every other species of plants and animals, possess an innate tendency to improve; this is sometimes pronounced "spontaneous," sometimes it is called "an accidental variability." The existence of the law has not been proved, however, but assumed. Are we not justified in asserting,—The existence of such a law should be established before sweeping deductions are made therefrom; at least stronger arguments should be presented than those which connect themselves with Natural Selection, which for all that appears to the contrary, may be nothing more than an agency which accumulates and preserves slight increments of improvement; but is nevertheless powerless in producing them, leaving the problem of favorable variations entirely unsolved. Hypothesis, unless it harmonizes with the facts and furnishes a consistent and reasonable explanation, ought not to be regarded as having attained to the dignity of a theory.

For anything that has as yet been satisfactorily proved, these improvements may be due to reversion; that is, the regain of lost characters. The struggle for existence, which is pronounced so extremely severe, may cause degeneration. Under domestication, or under more favorable conditions in Nature there may be a recovery of lost qualities. This explains the facts quite as well as Darwinism explains them, perhaps better; and it destroys the basis of the assumption that improvement may continue indefinitely. A limit exists, namely, when the original type is reached. Darwin admits that characters which have been lost may lie in the organism for thousands of generations with their powers of re-development undiminished, and that under favoring circumstances there is a gradual and constant improvement, an approach toward the lost type. It would seem, therefore, that neither improvement nor the preceding degeneration is necessarily due either to selection or to an innate tendency. Advance may result from the presence of conditions favorable to improvement; degeneration, from the absence of such conditions. Darwin admits that the latter has taken place on a very extended scale, having invaded every known species. He seems even to have concluded that all improvements are results of reversion.

Nor is evidence wanting that, reversion is a law similar to well known laws. There is in Nature the power of reparation, even to the extent of reproducing a lost member. A crystal, when one of its edges has been broken off, if placed in a solution similar to that in which it was first formed, will reproduce its lost edge, repairing its integrity. Until the edge is reproduced, there is an imperfect equilibrium of forces. Would it be correct to say, The improvement of the crystal is limitless?

Since this progressive development is a virtual destruction of species, as Darwin's theory of pangenesis is a destruction of individuals, it seems easier to accept the scriptural account, which, however distasteful to many, is apparently environed with fewer difficulties.

It is contended, however, that long periods are a necessary factor in these transmutations, the difficulties being greatly diminished or entirely removed by the assumption of an indefinite period through which improvements have been accumulating. How four hundred millions of years could aid in removing the difficulty, it is difficult to see. If it has not been proved that within the historical era any species has passed beyond the barriers which separate it from allied species, there is as surely little evidence that the mere lapse of cen

turies would effect any marvelous transformations. Moreover, there is a strong probablity (quite as strong as the presumption that species are mutable) that the earth has not been adapted to animal life for millions of years – probably not even for a million, a period far too brief, evolutionists would think, for the changes which have occurred.

RADIANT HEAT, LIGHT AND ACTINISM.

BY REV. PROF. S. WOOD.

It is supposed by many, that the undulatory or wave-theory of light is now satisfactorily established; at least, as against the emission or *corpuscular* theory, as it has been generally adopted by physicists. Under the head "*Radiation*, in *Library of Useful Knowledge*," occurs the following passage: "The subject of radiation has received much attention from scientists within a few years, and many interesting discoveries have been made, which go to indicate that the rays of light as well as heat possess mechanical force, which may be converted into continuous motion. . . . . The results of these experiments have raised a doubt in the minds of some, in regard to the undulatory theory of light: some of the phenomena suggest the action of the direct motion of particles of matter; but such a hyphothesis was found long ago insufficient to account for many of the phenomena of radiation. And it is more probable that the theory of undulations will, as it has in all cases so far, afford sufficient explanation for the phenomena now under investigation."

The first objection raised against the *corpuscular* theory, was in reference to the velocity of the corpuscles and the supposed consequences which must result from the impinging event of such particles upon the eye. If such particles weighed but the one hundred and fiftieth part of a grain, they would have eight times the momentum—battering power—and five million times the penetrating power of a rifle bullet; and as many millions of them might be entering the eye at once, it seemed impossible to reconcile the supposed facts with the excessive delicacy of the organs of vision. It was also discovered, and satisfactorily established by experiments on the transmission of light through various media, that there were "spaces," or that the stream of light was not continuous, but in unequal "pulses;" the longer pulses being just beyond the red lights in the spectrum where the heat was greatest, and the shorter beyond the violet at the other end of the spectrum where the chemical effects were greatest. These phenomena were supposed to be inconsistent with the emission theory, and to suggest waves which required a medium. Under the head "*Undulatory Theory*" in *Library of Universal Knowledge*, edition of 1881, it is said: "It is not pretended by the advocates of the undulatory theory of light, that they understand the nature of the transference of energy on which they suppose light to depend; but they take from the analogy of sound in air, and of waves in water, the idea of the existence in all space of a highly elastic fluid (or quasi-solid), provisionally named the *ether*; and they suppose light to consist of the propagation of waves in this fluid. . . . . But as to the manner in which energy is thus transferred, we are entirely ignorant. . . . . It cannot be too strongly insisted on that all we know at present is—that light certainly depends upon the transference of energy from one part of the luminiferous medium to another; what kind of energy is transferred, vibratory or oscillatory motion, or rotation, etc., is a problem which may possibly forever remain unsolved. But vibratory wave-motion being that with which we are most familiar, as in earthquakes, sound, waves in water, etc., we naturally choose this as the most easily intelligible basis of explanation." "Light, then, consists in the vibratory motion of a medium, which, must, of course, fill all space. This is called ether. As yet, we have no idea of its ultimate nature. . . . . Meanwhile we may remark, that the mathematical theory of light on the hypothesis of undulations, requires that the vibrating medium should possess properties more nearly allied to those of an elastic *solid*, than those of a liquid or gas."

All that is really known about these "waves" of light is, that there are spaces or "wave-lengths; and that these *decrease* in length from one end of the spectrum to the other; which alone, should be fatal to the wave theory. It is not known certainly, whether the oscillations are transverse to the line of motion like water-waves, or whether they coincide with this line, like the supposed sound-waves. And there are some phenomena that seem to demand the mission and transmission of corpuscles. If the first objection against the corpuscular theory can be removed and the "spaces" accounted for, this theory would be much more tenable than the undulatory theory. This medium called *ether* is supposed to be a solid, and indeed must be so, in order to be of any value to the undulatory theory. If the oscillations of this medium be in the direction of the progressive motion, like the supposed sound-waves, the impact against the eye would be more severe than the direct impingement of radiating corpuscles, as there could be no waves of any kind in a solid medium, that filled all space, without "condensations and rarefactions;" and again, as these waves are moving in different directions from all luminous bodies, they would destroy each other, as they are supposed to do when passing around an obstruction and breaking upon each other which causes a shadow. Evidently in whatever way we view the subject, it becomes more and more evident that the phenomena connected with light, cannot be entirely accounted for by mechanics alone. The interference of light, which was called the touch-stone of the two theories, which, more than any other phenomena, led to the general adoption of the undulatory theory, is not satisfactorily explained by the vibrations of the supposed ethereal medium, and is open to this objection, that it requires two etheral media, each in active vibration, but on account of a greater rigidity in one, the vibrations are more sluggish, and the waves that are generated in this medium are more retarded; but as the vibrations of these two media are at right angles to each other, "the waves cannot quench each other, no matter what the retardation may be." Tyndall's fourth lecture, 1873.

Radiant light and heat belong to active forces of Nature, and like electricity, take in different *forms* in passing through different media, depending upon the *form* of the medium. The earth is the lowest plan upon which forces act; all the forces of Nature have but one origin. In the Divine it is Life itself: in the spiritual world this one force takes on different forms of living forces; or, from being general, becomes more and more specific, which establishes the *law* of evolution in the universe. The living forces from the spiritual sun, acting through the sun of our world produce all the forces that operate upon the earth. But as the *forms* of these living forces are changed by

their influx, so the active forces radiating from the sun change their forms upon entering the earth, and upon the lowest plane become mechanics; but the forces flowing into material things by which they are *caused*, are not mechanical. "Every created object is a representation of some Divine thought; therefore, everything does in some degree, image forth some attribute of God.

"Creation as a whole and in every part is a correspondence to the infinite mind, and the infinite power of God." (*Star and Covenant*, Sept. 16, 1882.) Every created thing must be an image of some attribute of the Creator, as it is an effect more or less remote of a Divine impulse; and this image becomes more specialized as it descends to the lowest things in Nature. In its first manifestation in the spiritual sun, it is general and universal. This sun is the first manifestation of the infinite love, the infinite wisdom and the infinite power. This law constitutes the heat of the spiritual world, the wisdom being the light; and the power that which works all the changes in that world, and corresponds to actinism.

The Divine wisdom is the medium by which the law and power are displayed; but they form a one, and cannot be entirely separated. This radiation from the spiritual sun is not mechanical; it is not by a force "*a tergo*," but by a force from within. As the Divine continually flows into that sun so it must, as from itself, radiate this influx upon and into a lower plane. The natural suns are formed through this spiritual sun, and are images of it in the highest form of natural substance,—etheral fire,—and receive influx from it constantly and ray it out upon a lower plane spontaneously. This is a universal law of creation: *every thing acts from itself.* As the sun of the natural world corresponds to the sun of the spiritual world, so its rays must correspond to the love, wisdom and power rayed from its prototype: —heat corresponding to love, light to wisdom, and actinism to power. These form a *one*, and are manifested as three principles or things, only upon entering the atmosphere, and in the direct ratio of its density.

SUBSTANCE.

BY J. R. HOFFER.

It is easily comprehended that whatever affects any of our physical senses is real and substantial. There may, however, be some persons who can not at once admit that sound, light, odor and heat are real substances; but all see that these can only proceed from things that are substantial. Now, the question comes up, How can an unreal thing, or that which is not substantial, affect that which is real and substantial? Or, does anyone doubt the reality of our bodily senses? But, are they not more real than anything else; for how could there be any knowledge, without them, of the existence of any thing?

If there were no life, there could be no physical senses; and without these, there could be no knowledge of anything. Can, indeed, anything exist without knowledge, or without that which can recognize it? We know, that before a thing can be done, there must be some knowledge how to do it. It requires knowledge even to think of doing it. The knowledge how to create, as well as what, had to precede all creation; and the idea would be unreasonable that what is created, is more real or substantial than that which created it. Even the skeptic, who seem sto believe that Nature produced herself, can hardly imagine that she could have done so without some knowledge how to do it; or even without a design or plan, which also implies knowledge. To ascribe anything to chance, or even to believe that there is such a thing as chance, is too absurd for thoughtful people in this enlightened age. There must, therefore, be mind or will and design, to create or produce.

But one of the things which the unbiased human mind comprehends by intuition, is, that there can be no existence without substance, and no substance without form or a body; also, that there can be no effect except by, and through something real. Thoughts, affections, love, hatred, revenge, produce effects, consequently exist and are substantial. But they have none of the physical properties of matter: nor are they subject to any of the laws of physics. They are not, therefore, material substances. And all immaterial existence being called spirit they are properly called spiritual substances.

To the materialistic mind spiritual existence seems very unreal; and to be able to comprehend that there can be no existence without substance, and that there are therefore, spiritual substances which constitue tall spiritual things, is an invaluable acquisition to persons whose minds have been fixed in materialism.

That spiritual substances or things are governed by laws, or order, similar to the laws that govern Nature, is now no longer difficult to comprehend. Nor is it hard to see that all life is spiritual, since it has no known material existence, except its effect upon matter. The same is also true of what are called the laws of Nature; which shows that they, too, are spiritual.

Life and the laws of Nature being spiritual, it is evident that all forces are spiritual. And since there can be no production, nor even existence, without force, the spiritual must be the realm of causes, and consequently the material that of effects. Spiritual substances are therefore living, and natural ones dead, and kept in exsitence by the spiritual.

It is, therefore, evident that the First Cause of all Nature can not be found in Nature. It is, however, self-evident that there must be a first cause working, as it were, from the center outward, and apparently resting upon its productions; as, it is known these effects must rest upon a cause. They are hanging like a chain from the First Cause, the lower links depending upon the higher.

DICHOTOMY.

BY REV. W. G. HILLMAN.

The distinction between *Matter* and *Mind* is a scriptural as well as a scientific fact. Both, however, have their respective claims—they being the only two primary substances which have a positive existence, *i. e.*, so far as our limited knowledge extends. Within their limits is embraced every classification of being. Matter is the embodiment of the mineral, vegetable and animal; *Mind* of the human, angelic and infinite.

Man is composed of both Matter and Mind. With this composition, he assimilates to the terrestrial, and approximates to the celestial. To prove that he has a body is unnecessary—his physical appearance and identity authenticate the truism. And that he has a soul is beyond contradiction,—his mental powers and capabilities render this self-evident. The soul's essence, therefore, assumes real personal entity.

The soul is a substance, distinct from Matter. This being so, how sublime and dignified is man! If he were a mere animal, he would be wholly gross and perishable. It is the spiritual, that raises him in the scale of Creation. With his intellectual qualities, he is, at once, a

"Dim minature of greatness absolute."

Indeed, the soul is the principal part of man, with his properites and passions. This, science cannot deny. Have not the most profound philosophers admitted the soul's substantiality? But why, with the Bible in our hands, refer to Plato and Pythagoras, to Socrates and Spinoza, to Bacon and Berkeley? One's own consciousness corroborates the Scriptural statements in favor of the soul's positive existence. And one's own conceptions repudiate the theory that the soul is like the body, *material.* Ah! the invisible part of man's composition is the intrinsically valuable. "What shall it profit a man if he gain the whole world and lose his own soul."

The soul is a living substance, superior to matter. It has an essential principle of life in itself. Nevertheless, this soul-life must be distinguished from the life which organized bodies have in common, viz.: the physical vitality that all animals enjoy. This is possessed by every animated being from the

"Unwieldly elephant down to the
Green myriads of the peopled grass."

But this is no evidence that they have immortal souls. If it were, all that possess life would be destined to live forever. In that case, the brute and the man must be placed in one category. Quoting a certain writer: "The soul must not be confounded with the life; a mistake that many philosophers and scientific students have made. The life, and the soul are essentially distinct. The life is perishable, while the soul is immortal; life is an ephemeral state doomed to enfeeblement and decay, while the soul is above every assault and escapes death. Like heat and electricity, life is a force engendered by certain causes; having begun it comes to an end, and beyond this end it is nothing. 'For what is your life? It is even a vapor that appeareth for a little time, and then vanisheth away.'" The soul, on the contrary, has no end. Thus hath God endowed man with a higher gift than physical life—a soul having life in itself. This he develops in thought, volition, perception and judgment. Thinking cannot possibly be a property of matter, and is not dependent upon matter. In fact, thought subsists in the mind, independently of any material medium; consequently mind is distinct from the brain, which is organized matter. Doubtless the brain is an instrument, and the very instrument which the mind employs in thinking; but, remember no instrument can employ itself. The soul is distinct from the brain. Else, God, who is a Spirit, having no brain, cannot be intelligent; and if so, there can be no God. But man's intellectuality of nature clears up the difficulty. Herein lies human rationality. In the irrational animal, instinct is a substitute for reason. Reason is based on reflection, instinct on sensation. How noble, then, is the creature man! "Thou madest him a little lower than the angels."

The soul is a spiritual substance, independent of matter. That is to say, it is an immaterial substance, unlike the body, simple in its essence. Being incorporeal, it has no parts—no dimensions. Besides, it is indivisible; and in this respect it is unlike the body; the body being divisible *ad infinitum.* A material object has the properties that are essential to its existence. It is so with the mental. Matter is inert, mind is active. Matter decays; but decomposition touches not the mind. Amidst the changes of time, the soul's moral susceptibilities and inappeasable longings, argue its immortality. And this amounts to demonstration—to absolute certainty. Inspiration has so declared. "And the Lord God formed man of the dust of the ground, and breathed into his nostrils the breath of life, and man became a living soul."

Thus Biblical Psychology presents man in his dual nature. In other words, man is represented as created of two parts esentially distinct. Two things are included in this account: First, that man's body was formed by the immediate intervention of God. It did not grow; nor was it produced by any process of evolution or development. Secondly, that the soul was derived from God. He breathed into Adam, that which constituted him a man—a living soul bearing the image of the Divine. Hence, the significancy of the terms *ruach* and *nephesh*; ηνευμα (pneuma) and ψνχϑ (psyche) which are used promiscuously to denote the soul. As the Rev. Dr. Hodge writes: "So far from the *nephesh, psyche, anima* or soul being distinguished from the *ruach pneuma, animus,* or mind as either originally different or as derived from it, these words all designate one and the same thing. They are constantly interchanged. The one is substituted for the other; and all that is or can be predicated by the one, is predicated of the other. The Hebrew *nephesh* and the Greek *psyche* mean breath, life, the living principle; that in which life and the whole life of the subject spoken of resides. The same is true of *ruach* and *pneuma,* they also mean breath, life, and living principle. The Scriptures therefore speak of the *nephesh* or *psyche* not only as that which lives or is the principle of life to the body, but as that which thinks and feels, which may be saved or lost, which survives the body and is immortal. The soul is the man himself, that in which his identity and personality reside. It is the *Ego.* Higher than the soul there is nothing in man. Therefore, it is so often used as a synonym for self. Every soul is every man; my soul is I; his soul is he. What shall a man give in exchange for his soul? It is the soul that sins (Lev. iv: 2); it is the soul that loves God. We are commanded to love God with all the soul. Hope is said to be the anchor of the soul, and the word of God is able to save the soul. The end of our faith is said to be (1 Pet. i: 9) the salvation of our souls; and John (Rev. vi: 9; xx: 4) saw in heaven the souls of them that were slain for the word of God. From all this it is evident that the word *psyche* or soul, does not designate the mere animal part of our nature, and is not a substance different from the *pneuma,* or spirit." *Dichotomy,* then, is the doctrine of the Word of God.

Some, indeed, of the Early Fathers held that man consists of three parts: *body, soul* and *spirit*—*corpus, anima* and *animus.* And this doctrine of Trichotomy is held by some modern theologians. In confirmation of their views they appeal to 1 Thess. v: 23;—"I pray God your whole spirit, soul and body be preserved blameless," &c., and assert that the spirit is that intellectual and moral nature by which man is distinguished from the lower animal; and the soul, that living principle which, as to its powers and affections, is the same in kind in man and brute; and the body, which in both man and brute is a material substance. But all who hold to the two-fold nature of man (Dichot-

tomists) reply that though the Apostle would distinguish between intellectual powers of man and his affections or passions, yet he never meant to teach that *spirit* and *soul* were two distinct substances. The only living principle may have two classes of powers, and yet be itself only one substance.

What the meaning of the above text is, must be learnt by reference to other passages of Scripture, "comparing spiritual things with spiritual." In writing it, Paul only uses a periphrasis for the whole man. As when, in Luke i : 46, 47, the Virgin says, "My soul doth magnify the Lord, and my spirit hath rejoiced in God my Saviour," soul and spirit in this passage do not mean different things. And when we are commanded, "Thou shalt love the Lord thy God with all thy heart, and with all thy soul, and with all thy strength, and with all thy mind," (Luke x : 27), we have not an enumeration of so many distinct substances. Nor do we distinguish between the mind and heart as separate entities, when we pray that both may be enlightened and sanctified ; we mean simply the soul in all its aspects or faculties. Again, when in Heb. iv : 12, the Apostle says that the word of God pierces so as to penetrate soul and spirit, and the joints and marrow, he does not assume that soul and spirit are different substances. The joints and marrow are not different substances. They are both material; they are different forms of the same substance; and so soul and spirit are one and the same substance under different aspects or relations. We can say that the word of God reaches not only to the feelings, but also to the conscience, without assuming that the heart and conscience are distinct entities." These strictures of the prince of theologians certainly accord with the scriptural distribution of human nature into soul and body, as given in Genesis. This doctrine, moreover, is confirmed by other inspired references. In Ecc. xii 7, we are told of what becomes of two parts, at death; but nothing is said of a third part. And when Christ speaks, in Matt. x : 28, of those who could kill the body, but could not kill the soul, He evidently represented these two parts as constituting the whole man.

UNIVERSALISM AGAINST ITSELF.

As this book in its revised form is now ready for the reading public, we deem it fitting to make a few brief statements with reference to the work.

First. Those who have sent their names for copies need not wait for further notification, but can send on the remittance ($1.00) and receive the book by mail.

Second. As the pages of the book in its present form are considerably larger than those of the former edition, we have increased the quantity of matter in the volume by adding at the close our pamphlet on the "*Immortality of the Soul, Philosophically Demonstrated*," and the three leading Editorial articles from this volume of THE MICROCOSM entitled—"*Does Death End All?*" which we trust will prove acceptable to the general reader as an appropriate culmination to that lengthy analysis of Scripture teaching, embracing, as it does, a critical examination of more than 800 separate texts from the Old and New Testaments, most of which argument and exegesis are found nowhere else except in this volume.

Third. The book contains a superior steel-plate portrait of the author from a photograph by Rockwood, which is considered better than any that has yet been taken of him, especially about the eyes.

Fourth. When this book was published by the *Methodist Book-Concern*, in Cincinnati, Ohio, about thirty years ago, they employed the Rev. W. P. Strickland, D.D., a prominent clergyman of that denomination, to write an introduction to the work after carefully reading it. This introduction we considered so well written, so expressive, and at the same time so comprehensive, that we have concluded to retain it in the revised book, and doubt not it will meet with the approval of the old friends of the work who still own copies of the first edition.

Fifth. To give the readers of THE MICROCOSM in advance such a synopsis of the book as we could not possibly write ourself, we think best to copy, as we do below, this brief introduction by Mr. Strickland just as it appears in the work itself.

One thing can be relied upon, that the scriptural arguments, and the exegesis of the different texts will not be disapproved by ministers of any religious denomination, with the exception, perhaps, of the Universalists ; and we have tried so to temper the tone of these arguments and criticisms while retaining their invincibility, and so to prune out of the old edition all crude and unpleasant expressions which grew out of the rancorous controversies of that early day when it was first written, as to render the book not seriously objectionable even to Universalist clergymen themselves, except so far as the force of the arguments is concerned.

INTRODUCTION TO UNIVERSALISM *vs.* ITSELF, BY REV. W. P. STRICKLAND, D.D.

The system of belief denominated Universalism, which teaches that all men will be saved irrespective of moral character, is as old as sin itself ; and grows as necessarily out of the depravity of the heart, as rank weeds are produced by a luxuriant and uncultivated soil.

Perhaps no form of error has ever been devised so perfectly adapted to deceive the lovers of sin, as the one under consideration. It at once addresses itself to the depraved appetites and passions of men; and is so admirably adjusted to this end, that it inspires a fallacious hope, in which there is no reason, and for the support of which, there is no evidence.

Whenever the heart pleads the cause, the understanding is a very lenient and partial judge. That which men wish to be true, they require but little evidence to convince them of its truth; and, on the other hand, what they do not wish to be true, scarcely any amount of evidence is sufficient to convince them of its falsehood.

The following work is a thorough but fair analysis and exposure of a system, false in all its leading features, and more dangerous in its tendencies than all other errors put together. It brings the doctrine of Universalism at once to the test of scripture truth, and carrying the war into Africa, shows up, in the sunlight of demonstration, its gross absurdities and palpable inconsistencies. The book deals in facts, any one of which is worth a volume of assertions and arguments, however plausible.

The reader will find that throughout the entire work, the Bible is made its own interperter, and the very passages on which the advocates of universal salvation rely for the support of their doctrine, are, by a true interpretation, turned directly against the system. It follows up and analyzes every exegesis, every argument, and every proposition ; tearing off the veil of sophistry, and exposing the system in its true light ; leaving not a

single book on which to hang a hope of salvation only through the gospel method of repentence towards God, and faith in our Lord Jesus Christ.

Every orthodox minister is here furnished with a text-book on Universalism, superior to any work of the kind heretofore published; and every private Christian, by reading it, may at once discover the fallacy of that reasoning which ignores every attribute of God, except His mercy, and even destroys the character of that attribute, by requiring its exercise at the expense of, and contrary to, all the other attributes of Deity.

SPECIMEN PRESS NOTICE.

[We take the liberty of copying below the kind editorial notice of the work we are doing, from the pen of Dr. Robert Walter, Editor of the popular and ably-conducted medical journal—"*Health*"—at Reading, Pa.:—]

"It were a curious and interesting study to discover how popular, and even scientific, beliefs come to be established. We are of the opinion that such study would develop the fact that mankind at large accept that which is taught, because they have never really considered whether it is true or false. We are all so busy with the practical affairs of life, or, perhaps, so lazy, that we are glad to shift the responsibility of deciding what is truth upon some one else, and so blindly follow some great name, right or wrong. In this way we continue until perchance some earnest, resolute, and keen thinker shall probe the mystery enveloping some great scientific question, and expose its frauds upon popular ignorance. The *Principia* of Newton has been unquestioned so long that it would seem the very consummation of audacity to question its correctness. Even the more modern theories of evolutionists are settling down and being accepted by the present generation as veritable truth. But errors in physical science are by no means difficult of discovery, and it is with a feeling of intense satisfaction that we are able to chronicle the fact that at least one intellect, ably seconded by many educated followers, is able to expose the fallacies, destroy the conclusions, and unmask the absurdities of so-called scientific teaching. Wilford Hall is doing a work for mankind that will live while human thought is triumphant. He not only exposes the weakness and absolutely overthrows the claims of modern evolutionists, but he even questions the teachings of the great Sir Isaac Newton—has, indeed, proved, to the satisfaction of many learned men, that these are not infallible.

Of course it is not expected that all men will agree with us in this estimate of the man, especially such as have committed themselves to the doctrines of materialistic infidelity. We notice that our contemporary, J. H. Kellogg, editor of *Good Health*, does himself no credit by ridiculing that which he evidently has not investigated and knows nothing about. Young men, like Kellogg, just from school, crammed to repletion with pseudo-scientific pabulum, may sneer at Wilford's teachings; but, in our opinion, Wilford Hall has done more sound thinking within one year than his critic has ever been capable of. It is one thing to be able to read the book of Nature, and quite another thing to swallow the teachings of the professors; and it is rare that we find an intellect who can do both at the same time. The gift of *bolting* mental pabulum is not at all favorable to sound reflection or mental digestion. We welcome Wilford Hall as an orignal thinker, who is destined to leave his mark on the annals of this century in a more prominent fashion than most men of his time, and his MICROCOSM as a repository of true science that has few if any equals."

PROF. HUXLEY'S OLD CARD.

Rev. J. W. Barrett, Kingswood, N. J., sends us the following note, and old card from Prof. Huxley:—A. WILFORD HALL:

Dear Dr.:—While I am sending a letter containing the names of subscribers for THE MICROCOSM it occurred to me that many of your readers would be amused with Prof. Huxley's 'card' which was published in "*The Christian World*" in 1871, and entitled

"*A Hint to the Protestant Ministry:*"

"As regards the facts of physical science, the clergy are at present divisible into three sections: an immense body who are ignorant and speak out; a small proportion who know and are silent; and a minute minority who know and speak according to their knowledge. By the clergy, I mean especially the Protestant clergy. Our great antagonist,—I speak as a man of science,—the Roman Catholic Church, the one great spiritual organization which is able to resist, and must, as a matter of life and death, resist the progress of science and modern civilization, manages her affairs much better.

It was my fortune some time ago to pay a visit to one of the most important of the institutions in which the clergy of the Roman Catholic Church in these islands are trained; and it seemed to me that the difference between these men and the comfortable champions of Anglicanism and of Dissent, was comparable to the difference between our gallant volunteers and the trained veterans of Napoleon's Old Guard. The Catholic priest is trained to know his business, and do it effectually. The professors of the college in question, learned, zealous, and determined men, permitted me to speak frankly with them. We talked like outposts of opposed armies during a truce,—as friendly enemies; and when I ventured to point out the difficulties their students would have to encounter from scientific thought, they replied, 'Our Church has lasted many ages, and has passed safely through many storms. The present is but a new gust of the old tempest, and we do not turn out our young men less fitted to weather it than they have been in former ages, to cope with the difficulties of those times. The heresies of the day are explained to them by their professors of philosophy and science, and they are taught how those heresies are to be met.'

I wish that all ecclesiastical organizations were in so effective a condition. I think it would be better, not only for them but for us. The army of liberal thought is at present in very loose order; and many a spirited free-thinker makes use of his freedom mainly to vent nonsense. We should be the better for a vigorous and watchful enemy to hammer us into cohesion and discipline; and I, for one, lament that the bench of Bishops cannot show a man of the calibre of Butler of the 'Analogy,' *who, if he were alive, would make short work of much of the current 'a priori' infidelity.*"

☞Any person who will send us the names of three subscribers for this volume of THE MICROCOSM, with the money ($3.), will receive a beautiful copy of "*Universalism Against Itself*," free.

PROF. LARGE'S PROBLEM

A. WILFORD HALL: *Dear Sir,*

I see, in the December Number of the MICROCOSM, a letter from Prof. J. S. Large, and your reply thereto. I can give an item in my own experience which may probably lead to investigation in a new direction.

I reside about eighteen miles (in an air line) from the Ohio River, on which boats are running (when water sufficient) at all hours of the day and night. Usually we do not hear them, but at rare intervals the hoarse whistle of the boats can be distinctly heard rising and falling in loudness just as the fall of water described by your correspondent.

I notice that this never happens except when there is no wind, but in a calm still evening, or at night when the noise in our village ceases. I often hear them quite distinctly. I observe, too, that a change of weather occurs invariably just after hearing them; thus the hearing of the sound, and a sudden change in the atmospheric conditions have come to be associated in the minds even of the *children*, who, on such occasions, will remark: "The weather is going to change, I hear the boats!

Now, as all atmospheric changes are more or less electrical in their phenomena, is it not rational to conclude that electricity has something to do with the transmission of sound in cases as above stated? May there not be currents of air, or masses of invisible vapor passing in such direction as may serve as conductors to the sound, by reason of the electric tension temporarily in them? And as all the so-called imponderables are closely allied to each other, could there not be a series of experiments set on foot to ascertain whether or not electricity in any of its forms has any thing to do with the *transmission* of sound?

I am perfectly satisfied that you have forever exploded the wave-theory. Now let us search in some other direction for a solution of the various phenomena of sound.

Prof. Large does not state what distance the sound of the falling water was heard; but in the case of the boat-whistles, I am sure that the distance is not less than eighteen miles.

Respectfully, yours, E. MATHERS.

THE RESURRECTION OF THE DEAD.

BY THEOPHILUS BRAY.

In THE MICROCOSM for the month of November appears an article from the pen of Rev. Gustave Reiche on "Substantialism," in which he makes the following (to us) remarkable statement, viz.: "The physical body cannot die because it never lived. It is only vivified by its spirit, or inner, or subtantial body. The physical body has not any more life in it than the meal we eat to sustain it." Mr. R. appeals to the Scriptures, and so do we, "For the wisdom of this world is foolishness with God." The Bible says: "The Lord God *formed* man of the *dust* of the ground, and breathed into his nostrils the breath of life, and *man* became a *living* soul." Who was Adam? He was the being that God *formed* out of the *dust*, and he was vivified by the breath of life in his nostrils before he had any "meal" to eat. He was a living soul and not a dead soul. At least, this is what the Bible says about it; and we propose to stick to it until we find that it is one of the so-called "Mistakes of Moses." The Psalmist saith: "He knoweth our *frame*; He remembereth that we are dust." It is very strange indeed that if man has another frame, "An inner, or substantial body," that the inspired penman should know nothing of it. Again, we read that the Lord punished this same living soul with death, because *it* eat of the forbidden fruit. The sentence was, "*Dust thou art*, and to dust thou shalt return." According to Mr. R's theory, instead of death being a punishment to Adam, it was a reward; and by it he was sent to glory. How can that which never lived be punished with death?

We have not space for more on this point, as we want to look at his novel theory of the resurrection. He quotes the words of our Saviour to the Sadducees, "Now that the dead are raised, even Moses showed in the bush, when he called the Lord the God of Abraham, and the God of Isaac, and the God of Jacob, etc." Then does away with this grand promise of the resurrection, by the following extraordinary explanation, viz.: "The dead *are raised*, not *will be raised*, but '*are raised*'—continually raised!" If such is the case, there is no resurrection, and none is needed; and Mr. R., himself, must be a Sadducee.

Justin, who lived in the second century, speaks of those who teach such a doctrine, as follows: "If, therefore, you meet with some who are called Christians—who confess not this truth, but even dare to blaspheme the God of Abraham, the God of Isaac, and the God of Jacob, and say there is no resurrection of the dead, but immediately when they die their souls are received up into heaven—take care you do not look on them as Christians." William Tyndall, the learned translator of the Bible, in speaking of the same thing, says it "Destroys the arguments wherewith Christ and Paul prove the resurrection." For our part, we fail to understand how anything can be resurrected that has not been destroyed; for if we fall not, how can we rise? If the words of Jesus prove that the dead are "continually raised," then the words of Isaiah, spoken 750 years before Christ, "Unto us a Child is born; unto us a Son is given," etc., proves that Jesus was born 750 years before he was born; not only was born then, but is continually born! Such a theory is a *reductio ad absurdum*. Does the "inner, or substantial body," die—if not, how are the *dead* raised? If Abraham, Isaac and Jacob are "*raised*," how about David? In Acts ii., we read: "Brethren: I say unto you, freely, of the patriarch David, that he both *died* and was *buried*, and his grave is with us unto this day * * For David ascended *not* into the heavens." The point the apostle made was plainly this: David prophesied not of himself, for he (David) was *not* in heaven, but in his grave. Jesus in speaking of those "That shall rise *from* the dead," saith: "Neither can they die any more; for they are equal to the angels." Paul speaks of the same event, as follows: "This corruptible shall put on incorruption, and this mortal shall put on immortality."

Now let us take the case of Lazarus; when he had his resurrection (according to Mr. R,) he was equal to the angels, and neither could he die any more; he was immortal and incorruptible. Yet we have Jesus calling with a loud voice, "Lazarus come forth!" when "He that *was dead* came forth bound hand and foot." Now which Lazarus was it that came bound hand and foot from the grave? Was it the angelic Lazarus who, according to Mr. R. had been in heaven four days, hence incorruptible and immortal, or was it he of whom Jesus spoke saying: "Plainly Lazarus is *dead?*" Or did the angelic Lazarus come down from heaven incorruptible and put on the corruptible body of him who

had been dead four days? Is this what Paul meant by corruption putting on incorruption? Such a theory of the resurrection is some of the foolishness heretofore refered to; it is but a figment of the imagination. To what do the following texts refer? "Marvel not at this, for the hour cometh when they that are in their graves shall hear His voice and come forth." "Thy dead men shall live * * * awake and sing ye that *dwell* in the dust." So far as the Lord being God of Abraham, Isaac and Jacob is concerned, it is a glorious promise of the resurrection; for He is a "God who quickeneth the dead and calleth things that are not as *though they were*;" for though we be dead, we all live unto Him." For to this end Christ both died and lived again, that He might be the Lord *both* of the dead and the living." It is Longfellow who says: "There is no death; what seems so is translation," &c. We think Mr. R. agrees more nearly with Longfellow than with the Law and the Gospel. Did the following event take place where Abraham, Isaac and Jacob were "raised?" "The Lord Himself shall descend from heaven with a shout, with the voice of the Archangel and with the trump of God, and the *dead* in Christ shall rise first, therefore comfort one another with these words." To us this is a substantial comfort; and we love to think that we as well as Paul, "Hope to attain unto the resurrection *from* the dead."

Washington, D. C.

REMARKS: We depart somewhat from our usual course in admitting this article in criticism of an esteemed contributor. But we do this, because there is much inquiry and even anxiety upon this question of the literal resurrection of the body that is deposited in the grave. We do not see how such a view can be avoided by a literal reading of the scriptures. At all events we intend to give both sides of this question in brief articles, for the benefit of our readers.

A PROBLEM FOR THE MICROCOSM.

Why does a foot-rule in passing lengthwise over a roller, travel twice the distance described by the roller along the table or plane over which it travels? and why has the size or diameter of roller, nothing to do with the result?

L. B. HARTMAN, M. A.

Trenton, N. J.

ANSWER.

Because, the average bodily motion of the roller is only half as fast as its upper surface where it is in contact with the ruler. That is, the upper surface of the roller travels just as fast as the ruler; but as the lower surface, or that part continually in contact with the table does not travel at all (since it does not slide), hence the average travel of the roller is its centre, half way between its two contact surfaces,—one traveling full speed and the other nil; consequently it makes no difference as to the size of the roller employed.

OUR CONTRIBUTORS.

We are receiving many articles criticising the different papers which have appeared in this journal. Now, it is not to be expected that every article which appears should meet the approval of every contributor, or of the Editor himself. We do not expect to be able to agree in all respects with the various writers whose productions appear from month to month in these columns. It is well that it is not so, for how will we advance in knowledge if everything published is only what we knew already, and that with which we perfectly agree? Let all good writers be heard, within reasonable bounds, and let those who have views, varying, and *well digested*, write them out in good English, *correct in every respect for the compositor*, and send them to us. This is better than entering into a controversy with a contributor, which leads to replies, counter-replies, etc., etc.

BACK NUMBERS.

All subscribers for Vol. II. of THE MICROCOSM, should take the magazine from the beginning of the volume (August). As the work is electrotyped, we can supply the back numbers at any time in the future. Remember this.

DR. VAN DYKE ON EVOLUTION.

Those of our readers who wish to enjoy an intellectual feast, should read the series of masterly papers from the pen of the Rev. Dr. Van Dyke, on the supposed evolution of man's physical nature from the lower animals, commenced in this number of THE MICROCOSM. Those who have had any leaning toward the beastly doctrine of Darwin, will be very apt to have their faith shaken, if not their doubts entirely removed. The series will consist of five consecutive papers, going over the entire ground.

CARELESSNESS OF SUBSCRIBERS.

We are constantly receiving complaints from subscribers who have failed to get their MICROCOSMS. Upon searching, we find in a majority of cases, that it is owing to change of residence, without timely notification to this office. Hence, one number goes to the old address after the subscriber has moved, and before we have had time to change our books. Many subscribers give their new address, but fail to name their old one; and some fail to give any address at all, or even to sign their names! Of course, in such cases, we can do nothing.

KINDNESS OF THE PRESS.

We are very greatly indebted to our brethren of the press throughout the country for the liberal, and even flattering notices of THE MICROCOSM, given from month to month. We venture to say that no such unanimity has occurred in the favorable reception of a journal in this country before, with scarcely one dissenting paragraph in nearly a thousand notices, many of them containing a full column. To say that we thank these editorial friends for such kindly recognition of our labors, in behalf of the cause of truth, both scientific and religious, is but a faint symbol of our real feelings and sentiments.

THE STEEL ENGRAVING OF THE EDITOR.

☞The portrait of the author, in "*Universalism Against Itself*," as a frontispiece, is pronounced one of the finest steel-plate engravings ever executed.

WILFORD'S MICROCOSM.

23 Park Row, New York, Jan., 1883.

A. WILFORD HALL, Ph.D., Editor and Prop'r.

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Rev. THOMAS NIELD.....Elmira, Mich.
Rev. W. G. HILLMAN.....Jefferson, Iowa.
THEOPHILUS BRAY.....Washington, D. C.

SPECIAL NOTICE.

In our conduct of this journal we desire to give our list of excellent contributors the widest possible latitude for the conveyance of their honest convictions, so long, at least, as this liberty does not conflict with the general aim and scope of THE MICROCOSM. But we wish our readers definitely to understand that we do not hold ourself responsible for the views of our contributors, nor, in fact, even for our own views, as we are liable at any time to change ground on receiving more light, as we have done more than once since this paper was commenced. But, generally, we hope and aim to be consistent. EDITOR.

HENRY WARD BEECHER AN EVOLUTIONIST.

For some months we have watched, with a good deal of care, mingled with anxiety, the culmination of Mr. Beecher's improved theological views. It was plain to those who have followed his gradual changes of sentiment, as developed from week to week in Plymouth pulpit, that he was slowly, but surely, tearing himself loose from the old and time-honored moorings of orthodox Christianity, and cautiously adapting his religious views to the more liberal creeds of the day—such as those of the Unitarians and Universalists. We had watched a similar course, for years, in Rev. Mr. Frothingham, till his preaching had so far divaricated from everything bordering on Scriptural theology, that his conscience would no longer permit him to pray in public, and which finally culminated in driving him from the pulpit altogether. The same was witnessed in the career of Rev. Mr. Miln, whose wanderings from the Bible doctrines were recently seen to crop out in a public rejection of the Scriptures as an inspired book, and the substantial avowal of atheism.

Many, however, believed that Mr. Beecher would not venture objectionably away from the landmarks of his honored forefathers, but that he would close his pulpit labors as he had begun them—substantially an evangelical Christian minister. But all misgiving upon this question is now at an end. In a sermon preached from Plymouth pulpit on the 26th of November last, this renowned divine boldly and defiantly broke asunder the last link that had bound him to orthodoxy and avowed himself a Darwinian evolutionist. This had been foreshadowed in his speech, withdrawing from the Congregational Association, and in his paper published in the *North American Review*. But still there was, as it was hoped, a passable way open for an honorable retreat from outright Darwinism. All this, however, is a thing of the past. In the sermon referred to, he not only avowed himself an evolutionist in the most radical meaning of that term,—the development of man from the ape, and from still lower classes of the animal kingdom,—but he went so far as to declare that Paul, the apostle, "was a Darwinian," because he taught that man had an animal nature as well as a spiritual! To say nothing of this weak and even puerile application of the apostle's manifest and truly philosophical teaching,—a perversion which any Sunday-school scholar, ten years old, in Plymouth Church can expose, and show to be ridiculous,—it is simply astounding to hear this once eminent thinker make such a ludicrous statement as that Paul was a "Darwinian" 1800 years before Darwin was born! The same as talking about a man's being a Calvinist hundreds of years before John Calvin existed! Such twaddle as this, is a logical indication that the once famous pulpit orator has

at last deteriorated intellectually, if not morally, till he is a proper candidate for conversion to modern evolution, with all its startling absurdities and monstrous self-contradictions. Hence, it is not surprising to hear him tell his audience, as he did: "You are not worthy of such an ancestor as an ape!"

We naturally inquire: What does Plymouth Church think of this kind of talk? Will the old Christian members of that congregation take it all down as law and gospel, just because it comes from Mr. Beecher? Or will their old-time veneration for the validity of God's word assert itself and cause a solemn protest to be filed against this beastly gospel of dirt? If the membership of that church can quietly submit to such a departure as this from the plain teachings of Scripture truth—teachings inculcated from the first chapter of Genesis to the last chapter of Revelations—without inviting their apostate pastor to step down and out, then we see no reason why they would not stand with open mouths, nodding assent, and hear him publicly denounce the Bible as of human origin, and proclaim himself an out and out atheist. There is but one single step, and that a very short and very consistent step, from this avowed belief in Darwinism, to that of open atheism. Prof. Hæckel, the distinguished naturalist, of the University of Jena, and the ablest evolutionist in Germany, if not in the world, was forced into atheism from Darwin's premises; and declared, in his "*History of Creation*," that no man, of a logical turn of mind, could believe in Darwin's views of the development of man from the lower animals, and not be finally driven into spontaneous generation, thus getting rid of a God entirely! Granting Mr. Beecher to be a sincere Darwinian, as he has thus publicly announced himself, the only thing that can possibly save him from outspoken atheism, will be either his want of ability to reason logically upon the subject, as did Prof. Hæckel, or his fear that even Plymouth Church might not be ready to indorse such a frank and consistent avowal. But we do not think he need be afraid of Plymouth Church. They have stood enough without swerving, during the last few years, to prove their loyalty; and their manifest approval of this last departure into open Darwinism may safely assure their pastor that outspoken *atheism*—the next act in the Plymouth drama—will not snap the tie of confidence which has hitherto bound them together. Hence, the public may be prepared for just such an announcement, as soon as Mr. Beecher has become sufficiently educated in the beauties of the theory of development, by reading Prof. Hæckel's works, to find out where the doctrine consistently and unavoidably leads. If he has not those works, we will gladly loan them to him; for the sooner his new departure culminates and goes to seed, the sooner the redeemable elements in his congregation will get their eyes open. And, then, we would sooner fight open Hæckelian atheism, than this most detestable conglomeration of religion and infidelity, called Theistic Evolution.

We certainly have a curiosity to know how the mothers in that church take to Mr. Beecher's Darwinian description of their babies. Look at his exquisite sentiment, ye Christian mothers of America: "When the babe is born, it *is nothing on earth but an animal*, and a very poor one." Of course, then, his advanced theology must teach that if this little animal dies, it must die the same as the young of a beast that perisheth, with no more prospect of a future life than has a pig or a puppy dying at the same age, since it is "*nothing on earth but an animal*"! This is clearly the religious sentiment which now obtains at Plymouth Church, and which she must boast, unless she turns her back upon her pastor and repudiates this new phase of Beecherism.

As a proof that Mr. Beecher has no intelligent comprehension of the evolution hypothesis, and the way to meet it, we have only to notice this reference to the total helplessness of the infant, which, though the prospective superior of the entire animal kingdom, and the most wonderfully developed of all animals when grown, yet which, at the start, is without any of the natural covering of its ancestors, and not a vestige of the natural instinct of the lemur, jackal, and opossum, from which it has descended by natural selection and survival of the fittest! Yet this profound thinker refers to such an overwhelming fact against evolution—an argument which no evolutionist has ever answered, or can answer—as among the reasons which led him to adopt Darwinism, and publicly to proclaim, in the advanced language of theistic evolution, that but for its potentialities "the poorest thing on this earth is that little *bag of meat and bones*, which we call a baby." We can but ask, in amazement, Has the religion of Christ and the theology of the Bible, in the mouth of the foremost divine in America, come to this?

We propose to notice this new departure of the pastorate of Plymouth Church soon again; and we hope to show to every member of that congregation, who will read, that a more silly, contradictory, and disgustingly shallow theory than that of Darwinian monkeyism, was never framed by man.

TRANSIT OF VENUS.

The great astronomical event of the year, if not of the century has come and gone, which is not to be repeated for the next 122 years. On the 6th of last month Venus, the bright and beautiful star, seen so often in the west at dusk, and in the east at dawn, passed between the earth and the sun as a round dark spot slowly crossing the sun's disc. Although this event will not take place again, as

relates to the earth, in 122 years, yet strictly speaking the very same event occurs every six hours, viewed at some point of the solar system. That is, as it takes Venus about six hours to cross the sun's disc, could an observer instantly change his point of observation, as Venus leaves the sun, to another and suitable point in the solar system, he would see the planet just making its first contact; and so on, an observer, with the power of flight supposed, could continually behold a transit of Venus taking place year in and year out. Our earth will simply again form one of these innumerable points of observation in the solar system in the year of our Lord, 2,004.

So important was this event considered by scientists that hundreds of thousands of dollars, possibly millions, were expended by governments and individuals for accurately observing it. Yet of what real value was it to the world? We do not deny its value to science, since accurate knowledge upon any abstract question of science or philosophy is of theoretic importance even when no practical benefit can result from the knowledge thus obtained. The chief advantage claimed to be derived from these expensive observations, is the more accurate determination of the sun's distance from the earth. But of what real use will this determination, within a possible margin of a few thousand miles more or less, be to the commerce or other substantial interests of the world? Will it ever add to the accuracy of nautical observations even sufficiently to prevent a single shipwreck or save one mariner's life that would not have been saved just as well with our present knowledge of the sun's probable distance?

Now mark; we are not objecting to this attainment of knowledge to the most refined possible accuracy in matters of scientific research, even by the extravagant outlay of money just witnessed, when necessary to be done; but we do object to scientists straining at gnats and swallowing camels; —expending millions upon finding the sun's exact distance from the earth as a mere achievement of science, and not expending a dollar to attain accuracy in other matters of science in which we are practically involved every day of our lives.

Take for example the science of *acoustics*, with which the affairs of daily life, as well as important commercial interests, are intimately associated. It is a fact that this enlightened government at Washington can not be induced to appropriate even a few hundred dollars for extemporizing a magazine explosion, which, as they know, or have received sufficient evidence to believe, would totally explode the received theory of sound and set a thousand colleges and other institutions of learning right upon a practical scientific question upon which they are now inculcating in the minds of tens of thousands of students the most superficial nonsense and calling it science! There are at this very writing, hundreds of professors of physics in the United States—practical teachers of the science of acoustics—who would testify before a government board of scientists that they believe the current doctrine of acoustics wrong from begining to end, and that the colleges, universities, and high schools of the country are all in error, and that they are now teaching false physical science in place of truth upon this subject. These same hundreds of scientific teachers would also testify before such a board, that individually they do not, when they can avoid it, teach the old theory at all since discovering its fallacy; but since they cannot control the colleges or change the erroneous textbooks on the subject, they are obliged to bide their time.

These professors would respectfully pray the government, if there was a move started to that effect, to inaugurate certain experiments for settling the scientific truth or falsity of the science as now universally taught. But what would the government say to these appeals? Would they say that this thing must be looked into—that it is not right for these tens of thousands of our young men to be taught falsehood for scientific truth, and that the simple experiments needed to expose the fallacy, if it be one, must be provided for, with men, instruments and money? Not a a word of it; for the matter has been already suggested more than once. A deaf ear is turned to such appeals; but as soon as a transit of Venus or a solar eclipse is to be observed, for the purpose of getting a trifle nearer at the sun's true distance from the earth, tens of thousands of dollars are nothing to be lavished. Ships are nothing, and telescopes and other apparatus are nothing, if required by a few leading scientists. Is there no remedy for this apathy? As there seems to be no use in appealing to the government, we now appeal to the colleges and universities of the country; and, in the name of more than one hundred professors, and more than ten thousand students of physics, who protest against teaching or being taught this impeached theory of sound till it is scientifically vindicated by its advocates, we ask them, or some one of them, to move in this investigation, and either champion the old theory, or help to inaugurate measures for reconstructing our text books, and thus ridding them of the self-manifest errors upon this question of acoustics, of which they are full. We have pledged THE MICROCOSM for a ton of gunpowder, toward helping forward these experiments, whenever any college shall inaugurate them, for the purpose of vindicating the old theory of air-waves or else driving it from our schools. Dr. Swander, our able contributor, of Tiffin, O., intimated in his great article in the "*Reformed Quarterly Review*," that $10,000 were ready for any college with which to endow a chair of physical science, whenever such college,

by proper experiments, would vindicate the present science of acoustics against the objections raised to it in the "*Problem of Human Life.*" Joseph Goodrich still stands to his offer of $5,000, made over and over in these columns, to any one who will vindicate by an experiment the great acoustical law of *interference* of sound-waves, as laid down in the most definite manner in all text-books on the subject, and as taught in all our schools. Some college, as a financial speculation if not for the sake of science, should undertake this vindication; unless they feel sure, as some of them actually do, that the whole theory, as now taught, is a fraud upon science, neither worth vindicating, nor susceptible of being vindicated! Then, plainly, they should act for the benefit of true science, as well as for the good of the rising generation, and get rid of the whole thing by an immediate revision of the text-books on physical science. At all events, we make the appeal, and pause for a reply. What college will take the initiative?

THE LAW OF SOUND-INTERFERENCE.

PROF. MAYER, HEARD FROM AT LAST.

The scientific thinkers and writers of the country are beginning to become aroused to the fact that the wave theory of sound, as taught in all colleges and formulated as science in all text-books on physics, is without foundation in fact, or reason. When our treatise on sound was first published, about four years ago, the author was pronounced crazy by many college professors for calling in question the received doctrine of acoustics, which had never before been doubted for hundreds of years or even since its origin, as supposed by Pythagoras, more than 2000 years ago. Many are the slaps the author of the "*Problem of Human Life*" has received, for his venturesome attack upon so well-established a theory of science as that of acoustics, in such papers as the *New York Independent, New York Christian Advocate, New York World*, etc.; and all, too, by writers who have not, perhaps, given the question an hour's serious study, and who do not know what the arguments are that have been massed against the old theory. They have simply read far enough to see that the author runs counter to accepted science, which was all-sufficient for a cue to such superficial critics for calling forth their bigoted ridicule of what some of them acknowledge they have not read at all. It is different, however, with men of science who possess a spirit of investigation. Some of these come out frankly and confess that the venerable theory of acoustics has at last broken down, though a large majority of them prefer to remain silent, waiting for the current of popular indorsement to make their retrograde movement from the old doctrine easier than to retreat in the face of a storm of hisses from the *ignoram'*, who find it easier to sneer than to read what crosses the beaten paths of their life-long scientific beliefs. We know positively of a dozen or more scientific professors, and learned students of physics, who have become fully convinced of the utter falsity of the old theory of sound, but who have not the courage to admit the overthrow of the text-books on the subject in the face of their own teaching for years. One learned doctor and physical investigator, fifteen miles from New York city, who was informed by the author before his book was printed that he expected to overthrow the wave-theory of sound, expressed unwonted enthusiasm at the prospect of such an exciting revolution in science, and promised to be among the first to welcome the new departure if the attack was successful. But, though undoubtedly convinced that the old theory has hopelessly broken down, he hesitates to confess it before men!

Not so, however, with Dr. D. O. S. Lowell, the able scientific thinker and writer, of Ellsworth, Maine. In a recent article on the "*Use and Abuse of Text-Books,*" in the "*Ellsworth American,*" among many excellent thoughts, he refers to the new departure on sound in the following complimentary remarks, which we take the liberty of copying:

"Only last week I received from the publishers a work on physics, with the ink scarcely yet dry upon its pages. I turned at once to the chapter on sound, and read as follows: 'Is it possible for two sounds to destroy one another and produce silence?' And after a few experiments came the answer: 'Thus it appears that two sounds of the same pitch may unite to form a sound louder or weaker than either alone, *or even cause silence.*'

"Now, in contradistinction to this well-worn dogma, there has appeared for many months, in THE MICROCOSM, a standing offer of $5,000 cash, by Joseph Goodrich, of New York, to any person, small or great, who shall accomplish this result (called possible by all our text-books) and make affidavit of the fact. This offer has been sent broadcast through the land by the publishers of THE MICROCOSM and no one has yet claimed the reward. Meanwhile the editor, Wilford Hall, in his marvellous book, "*The Problem of Human Life,*" and through the pages of his journal, shakes many of the foundations of modern science, as did angry Neptune the walls of fated Troy; and as Copernicus overthrew the Ptolemaic system, and as Bacon supplanted the philosophy of Aristotle, so Wilford Hall threatens, with no uncertain voice, the overthrow of a scientific theory on which Tyndall and Mayer have built their reputations, and which is as old as Pythagoras. If he is right, our works on acoustics should be not only revised but rewritten; and his arguments are hard to be gainsaid."

In conclusion, we will only add that we have now lying before us a letter from Prof. Mayer to a friend of ours, who wrote him urging him to reply to the "*Problem of Human Life*" on the sound-theory. In this letter Prof. Mayer says:

"I have heard of the work of Hall, to which you

refer, but have never had the time to read it. If the gentleman referred to has annihilated the theory of sound to his satisfaction, and to that of his readers, *it is hardly necessary for me to refute him.* If he has discovered such important facts that the theory is subverted, nothing is to be said, *for the facts speak for themselves.* But if he has done this great achievement by his reason alone, I prefer, at present, to rely on the brains of Newton, Young, Helmholtz, and Sir William Thompson, to those of Mr. Hall, etc. * * *

Yours, very respectfully,

ALFRED M. MAYER.

STEVENS INSTITUTE, Hoboken, N. J., Nov. 28."

Take notice: This letter is from the pen of the greatest representative acoustician of America, who is every day teaching his classes of young men in the Stevens Institute, the wave-theory of sound as true and undoubted science, including the monstrous absurdity of sound-interference, the chief law of the theory; that is, the doctrine that total silence can be produced by producing two audible sounds? Yet he claims not to have read a book which is believed by hundreds of professors to overthrow this theory; and which *he knows* (as we happen to be certain of) attacks and reviews, most unmercifully, his own published teachings! All this is singular, to say the least, especially in the light of the fact that more than three years ago we sent Prof. Mayer a copy of "the work of Hall, to which you refer," and received from him a letter saying *he had received it, and that he was then reading it!* More anon.

THE MICROSCOPICAL JOURNAL.

This *fossil* of scientific investigation has spoken at last about THE MICROCOSM, as we have for some time been expecting. The editor has been so long looking at diminutive objects through the microscope, that nothing seems of any magnitude to his contracted vision, except when he chances to look into the glass. Then he sees something prodigious, at least in his own estimation, judging from his self-important style. He thinks the attacks upon the theories of sound and gravitation in this journal are as pernicious in their influence upon the "progress of education" as the effects of "obscene literature" are "upon morality"! Now we are willing to concede that Prof. Hitchcock may be a thorough expert in "obscene literature" and its practical effects "upon morality;" but we very much doubt if he has one single correct idea upon the true philosophy either of sound or gravitation. It is easy for such a self-consequential bigot to issue fulminations against our radical departures on the sound theory, but it is a much more difficult matter for him to attempt argument. Let Prof. Hitchcock try and persuade his friend, Prof. Mayer, to attempt a defense of the wave-theory in a series of articles in this journal, rather than remaining safely ensconced in his sanctum, issuing his contemptible denunciations against something he plainly knows nothing about. He says: "We can only express our sincere regret that such a paper as THE MICROCOSM can find readers enough in the nineteenth century to make its publication possible"! Yes, he would be glad to see any paper that dares to depart from the ruts of so-called science, starved down to his own diminutive circulation, which would almost take the power of one of his best microscopes to find it. He can learn, however, if he will take the trouble to inform himself, that more than ten thousand of the best educated classes of this country, who take THE MICROCOSM, such as physicians, clergymen, teachers, etc., are now laughing at the mummy who talks so wisely at 53 Maiden Lane, New York.

PROF. KEMPER IN THE "STANDARD."

It is now Prof. Kemper's turn. We promised last month to reply to his long *article* in the *Christian Standard.* We will not say *argument*, for there is very little argument about it. It is more like a consummate appeal to the prejudices of the *Standard* readers, than anything else we can think of; and we do insist that the editor of that paper must be hard pressed for aid in his controversy with THE MICROCOSM, when he will seek and admit to his columns such a mass of weak trash, as the article in question is principally composed of. It is filled with boastful assertions as to what the writer can and will do, and what "Wilford" pretends to do but cannot. We propose to quote copiously from this four column article to give our readers a glimpse at the style of these modern critics in their vain attempts to parry the resistless facts and conclusions of THE MICROCOSM. Our extracts will also exhibit the assumed scorn which such self-consequential professors of science pretend to feel for the arguments they know only too well they cannot answer. They will find out, however, that flippant quotations of ridicule from foreign languages against our assaults upon modern science, will not divert the increasing attention of the thinking world from these pages. Thankful are we that the readers of these diatribes, especially in the *Standard*, are generally thinking men; and that pretentious assertions and denials, as also pedantic sneers quoted from dead languages, pass with all sensible readers as mere puerility and wind. Look at this specimen extract from near the commencement of his article:

"We propose in this article, in three or four counts, to unsaddle the knight who rides such a high horse upon the royal road to learning, and start him afresh and afoot upon the path beaten by freshmen and sophomores. * * * * * *

When the demonstrations of the pure geometry are hooted down the winds; when the views of able writers are seldom understood, often, unintentionally perhaps, misrepresented; when a superlative incompetency, as we shall show, in the ele-

mentary notions of mechanics is displayed on every page; when an author, in the pointed language of Horace, "*Desilit in arctum unde pudor vetet referre pedem;*" then, perhaps, a true scientist, as did Tyndall, should let the farrago wind itself up, and its hoodwinked followers, each and every one, like a character in a German play, when brought face to face with the ridiculousness of his position, exclaim, *O Ich Esel!* Does this language appear to be too strong! Let not the readers of the "*Standard*" imagine for a moment that we have any but the highest respect for the talents of the editor of THE MICROCOSM, *in a business point of view.* By no means; it is the business "*method in his madness*" to which we object, as antipodal to the true scientific spirit, which is humanity's servant and a royal worshiper of all truth. Perhaps Wilford thinks he has studied the subject of *central forces.* Can he help it if his self-complacency got the whip-hand of his judgement while yet a boy? No; all our scientific indignation goes out, not against him, but against those complacent followers who, obeying the voice of unreasoning prejudice, throw up their caps and exclaim, "*Hurrah for Wilford! a bas la science!*" [Bah !]

We give this extract verbatim, as the style of two-thirds of the article, to show the kind of weapons such critics employ against us, who virtually say, all the way through their articles: "You see; we are the men, and wisdom will die with us! We are the men who can quote Greek, Latin, French, and German, and thus slap the troublesome editor of THE MICROCOSM in languages he knows not of, and make his readers think him but small potatoes, while we are enormous pumpkins!" But the reader will see, if he watches THE MICROCOSM, and notes the trend of these replies, that it will take something denser than cheap ridicule from foreign and dead tongues, to counteract such revolutionary scientific arguments as those which were brought against Newton's great demonstration last month by actual quotations from the "*Principia.*"

But who and what is this professor of mathematics and astronomy, who threatens "in three or four counts to unsaddle the knight" of THE MICROCOSM, and who claims to be familiar with so many dead and modern languages,—that he should put on such airs? Can he write good English? Take the following paragraph, and contemplate its elegance:

"Now, Mr. Editor, we are done with this nonsense. A polemic eel could not wriggle himself from the clutches of this mathematical devil-fish [that is Kemper, himself !] that has captured the editor of THE MICROCOSM, before he could confess his sins of ignorance and say Jack Robinson."

Whether it is the "polemic eel," the "mathematical devil-fish" or the "editor of THE MICROCOSM," that is personated by "he," who is supposed to say "Jack Robinson" very precipitately, is something we will leave Bethany College and the *Standard* to settle. If he means the editor, then it is manifest he is trying to say that the editor "could confess his sins of ignorance and say Jack Robinson" "before" a "polemic eel" could "wriggle himself from the clutches of this mathematical devil-fish"! That is to say, the editor is smarter than a "polemic eel" Whether to take this polished paragraph as complimentary or otherwise, is what puzzles us; so we shall have to give it up.

But we now come to consider the argument, what little there is in favor of Newton's law of the moon's fall from the tangent, as the basis of his great so-called law of gravitation. In our October review of Prof Kemper we made the assertion that he could not write one column in the *Standard* in favor of Newton's law without contradicting himself, and absolutely giving the controversy away to THE MICROCOSM. This last prodigious effort proves the truth of our assertion, though he had this very prophesy as a warning before his eyes, as he wrote. We will give one illustration now, and three or four others toward the close. He tries to show that Newton was substantially correct in maintaining a fixed tangent during a very small arc of the moon's travel, and that we were in error in denying this, and in claiming that no such thing as a fixed tangent, is assumable for the briefest possible fraction of a second, from which the moon can be supposed to fall. But in wildly striking out in all directions, he at last concedes that the moon does not fall from the tangent at all in any "actual sense," thus completely agreeing with THE MICROCOSM. Here are his words:

"A body moving in a circular orbit in *reality* neither rises nor falls from the circle, *nor from a tangent in an actual sense.*"

This is all we ask, and all we have contended for. There is no *actual* fall of the moon *from* a tangent, and consequently no *actual acceleration,* but an apparent fall constantly taking place, since the moon's line of tangential force is a real line; but as it keeps constantly shifting to keep pace with the moon along its orbital path, changing its direction every instant, the moon cannot, of course, *actually* fall *from* it, though it *apparently* falls from it, since it continually falls from the line the tangent had occupied the instant previous. To have the tangent fixed for even the fraction of a second, by which to measure the moon's rate of fall from it and thus determine the force of gravity that distance from the earth as Newton did, is utterly fallacious on its face, for the reason that it only compares approximately with the acceleration of a falling stone, as Kemper and Goodenow both admit, for a very brief period, but gets all wrong immediately after, varying farther and farther from the law of perpendicular acceleration as its departure increases from such fixed tangent till, as Prof. Kemper shows, when it nears the first quarter, or *ninety degrees,* all acceleration necessarily ceases. But how is it with a falling stone at the earth's surface, where real acceleration obtains? There is none of this "approximate" correctness

or agreement with the law, for a short period. The acceleration, as the square of the time, is absolutely correct from the very start—is an "actual" fall, and one whose acceleration is equally correct as long as the perpendicular fall toward the earth continues; showing that no similarity whatever exists between the real acceleration of a stone here, and the apparent acceleration of the moon from its tangent, for a very small arc. The moon's approximate resemblance to this acceleration, if the tangent be maintained for a brief period, is purely coincidental, since we found last month that Newton figured out an absolute coincidence between the two kinds of fall to the 4-9 of a *line*, or about the *one-thirtieth* of an inch in a second, while, as we showed, he actually left out *one-eightieth* of the entire fall of the moon! This proves that the fall of the stone here, or its rate of acceleration, gives us no correct law by which to determine the gravital energy exerted at the moon's distance, and that some new discovery is yet in store for estimating the true force of gravity, and its true ratio of decrease in controlling the moon's orbital course.

Now, we cannot present the real character and merits of Prof. Kemper's argument so well as first to give a long extract, containing its entire gist, and then let the reader deliberately analyze its peculiarities before noting our comments. This main part of the argument was evidently penned under intense confusion of ideas, while the professor was contemplating the disastrous effects of our charge in the October number, that Newton had absolutely left out *one-eightieth* of the value in not thinking of *the moon's pull of itself toward the earth*. The professor, as seen in almost every paragraph, is apparently looking wildly about to the right and the left as he writes, seeking to evolve something out of the fragments of Newton's broken yard-stick that will belittle the difficulty or explain it away. He positively writes at random, with an aimless kind of incoherency that excites one's pity. But here is the extract which will speak for itself:

"It is true that Newton may not have called special attention to it as an element that would disturb his calculations about the fall of the moon, because, as we shall soon see, *he did not wish to go down to posterity to be made a laughing-stock of; thinking, perhaps, that nature after many efforts, might furnish a substitute.* But we now come to the brunt of his criticism of what he calls Newton's oversight. He says:

'That eminent philosopher entirely left out of his calculation the important factor of the *moon's pull of itself toward the earth*, and only took into account, in estimating the fall from the tangent, the earth's pull of the moon, precisely as he correctly took into account only the earth's pull of a falling stone; since the stone is so almost infinitely small, in comparison to the earth, that its additional pull of itself toward the earth by its own attraction is too trifling to be taken into account, and may for the purposes of this argument be considered as nothing. Hence, while the falling stone's attraction of the earth adds nothing to its own fall by assisting the earth's gravity, it is plain that the moon does assist the earth's attraction *one-eightieth* in producing its own fall from the tangent.'

"There, now, the mouse is born, and the mountains are rent asunder. This is the effulgent light of pure genius. We are confident that no mere mortal could have detected this oversight of the great Newton, unless a Promethean spark from on high had fallen amongst his mathematical ideas and fired them into the brilliancy of an Edison light.

"Now, let us, in *plain language*, give a *boost* to his feeble mental effort to think out a *correct notion to its logical conclusion*. [Another brilliant sentence.]

'The moon,' says Wilford, 'draws itself toward the earth with *one-eightieth* of the force of the earth's attraction. *Granted.* Then, to put the idea in the usual form, we say that the effect is the same as if we conceive the moon to be deprived of this reciprocal attraction, and, *instead thereof*, a mass equal to the moon to be added to the earth, for it is obvious that this mass, being as Wilford says, *one-eightieth* of the earth, the additional attraction upon the moon will be equivalent to what he claims for the moon's attraction of itself.

"Now, for the simplification of the thought, let us conceive the stone to be placed at the moon's distance. Then, we say, the effect will be the same if, as in the case of the moon, we conceive the additional attraction to be due to the stone's mass placed at the earth.

"The question then resolves itself into this: The moon's mass at the earth attracts the moon, now devoid of reciprocal attraction, but possessed of inertia. The stone's mass at the earth attracts in like manner the stone. Argument: The attractions are as the masses, the inertias are as the masses, hence the accelerations are equal; and the moon's reciprocal attraction would impart exactly the same velocity to the moon that the stone's reciprocal attraction would impart to the stone.

Why, what can our philosopher be thinking about? Has he never yet heard that *in vacuo* a feather will fall with the same velocity as a cannon-ball, though their relative weights may be the same as that between the moon and the stone? This is checkmate number two."

Let us now look at the argument of this singularly confused piece of reasoning, instead of exclaiming, "O Ich Esel!" as it deserves.

The first thing that strikes us is, that Newton omitted calling attention to the moon's pull of itself *one-eightieth* as much as the earth pulls it, because he "did not wish to go down to posterity to be made a laughing-stock of." That is, Newton purposely left out this *one-eightieth* additional fall of the moon in consequence of its mass and attraction of the earth, because he thought it would have been ridiculous to include it or allow for it in his demonstration! Yet Prof. Goodenow insists that we have virtually made a "laughing-stock" of ourself by charging Newton with leaving out this *one-eightieth* additional fall, asserting that Newton had actually made it the "most prominent feature" of his demonstration! We will see, before we get

through, where the "laughing-stock" comes in By carefully noting the extract just made, it will be seen that Prof. Kemper, in a contradictory kind of way, first explicitly takes our position, and then tries to take the same position that Newton did, namely, that the moon and a pebble at the same height would fall, if let drop toward the earth, with exactly the same velocity. Yes, he does this, after broadly admitting that the moon actually falls with *one-eightieth* greater velocity than is caused by the earth's attraction alone. This proof is plainly to be seen in the extract just made. After quoting our statement of this very proposition, he says, "*Granted.*" Don't forget this. Then, to show that there is no mistake as to his meaning, and that he actually wishes to be understood as teaching that the moon, if let drop toward the earth, would add *one-eightieth* to its velocity in consequence of its attraction of the earth *one-eightieth* as much as the earth attracts it and in addition thereto, he goes on to explain: "the effect is *the same* as if we conceive the moon to be deprived of this reciprocal attraction, and *instead thereof a mass equal to the moon to be added* to the earth!" This is, no doubt, true to the letter. No one can doubt that if *one-eightieth* were added to the earth's mass it would pull the moon (deprived of reciprocal attractions) *one-eightieth* faster than it would otherwise fall by the earth's attraction alone; and as "*the effect is the same*" for the moon to pull itself by attracting the earth, of course we are right, and Newton has decidedly made a "laughing-stock" of himself by teaching, as so clearly proved last month by quotations from the "*Principia*," that the moon and a pebble let go at equal heights, would fall toward the earth with equal velocity. Manifestly a pebble would not add just *one-eightieth* to its velocity of fall by its self-attraction of the earth! Yet it is a fact that Prof. Kemper actually teaches that, as the moon's mass (one-eightieth) added to the earth, would cause the moon (deprived of reciprocal attraction) to fall *one-eightieth faster*, therefore the pebble's mass (only 1,000,000,000,000th) added to the earth would cause the pebble (deprived in like manner of reciprocal attraction) to fall *one-eightieth faster*, or with the same velocity as the moon, since their "accelerations" would be "equal"; and he winds it up by saying that "the moon's reciprocal attraction would impart *exactly the same velocity* to the moon that the stone's reciprocal attraction would impart to the stone"! Was there ever anything more absurdly self-contradictory or nonsensical? This distinguished mathematician, astonishing as it may seem, unequivocally tells us that a pebble at the moon's distance would fall *one-eightieth* faster than by the earth's attraction alone, *if another pebble of the same size were to be added to the earth!* Then, of course, if two such pebbles were added to the earth it would add *two-eightieths to the falling pebble's velocity!* No mistake about this. And hence, a small hand-basketful of pebbles emptied out on the earth would more than double the velocity of this falling pebble! Who is the "laughing-stock" now? Really, it seems astonishing that a man in his senses could suppose that the velocity of a falling pebble at the moon's distance could be influenced appreciably by adding another pebble of the same size to the earth—to say nothing of increasing such velocity *one-eightieth!* But this is a specimen of the mathematics of Bethany College.

Let us now endeavor to carry out the true principle of philosophy stumbled upon by the professor, as above stated, in reference to the moon's reciprocal attraction, and see where it places him. If the moon's added velocity of fall (one-eightieth) is the same in "effect" as if its reciprocal attraction were cut off and an equal mass added to the earth, as Prof. Kemper unequivocally and truthfully teaches, then it follows, if the moon were as large as the earth, its velocity of added fall in addition to the earth's attraction, instead of being *one eightieth* would be *exactly doubled*, the same as if such a large moon's reciprocal attraction were suspended, and the earth's mass were doubled! Is there any getting away from this? Plainly not. Suppose our earth immovably anchored. It is manifest that it would alone pull such a moon (deprived of its reciprocal attraction) just as fast as it would pull a pebble, if the pebble were in like manner deprived of its infinitesimal reciprocal attraction. No doubt about this. But restore reciprocal attraction to this large moon and it would pull at the anchored earth with the same force precisely as the earth would pull at it; and if the earth's pull alone would give the moon one complete velocity (the entire force of the earth's attraction), it is plain that such a moon's reciprocal and equal pull would double its velocity? If the present moon's *one-eightieth* of mass adds *one-eightieth* to the effect of the earth's attraction, as Prof. Kemper admits, then our supposed large moon would add *eighty-eightieths*, or would double its velocity! Then, also, each body of matter, of whatever size down to the pebble, would add velocity of fall in proportion to its mass! Can Prof. Kemper deny this? How strange, then, that a mathematician, after stating so clearly a true principle of philosophy, could not see if the moon's mass (one-eightieth) added to the earth would add *one-eightieth* to the moon's fall, that the pebble's mass (one 1,000,000,000,000th), added to the earth, would only add one 1,000,000,000,000th to the pebble's fall! Hence, the pebble, in consequence of its mass (1,000,000,000,000th), can only add one *million millionth* to its velocity of fall, and, consequently, the professor being judge, would fall slower than the moon if both were let drop together. Result:—Both Newton and Kemper are in error.

To show that we are not mistaken about the Professor's reasoning, see his last paragraph, which he calls "checkmate number two." He there positively asserts that the moon, if in our regions, and *in vacuo*, would fall with the same velocity as would a cannon ball, because a cannon ball and a feather *in vacuo* will fall "*with the same velocity*," while there may be, as he correctly states, as much difference in weight between the feather and cannon ball as between the cannon ball and the moon. We thus state his position very carefully that by no possibility shall he be misrepresented. And in thus fairly stating his position we have him hopelessly pinned down under the same argument that involved Sir Isaac Newton last month. Let it be remembered that Kemper agrees with Newton that a pebble and the moon, dropped together toward the earth from equal heights, "*would describe equal spaces in equal times in like manner as heavy bodies do on our earth.*" (*Principia*, Book III, Prop. VI.) And this, too, after he had "granted" that we were correct about the moon's fall! But now we come to the *denouement* in this scientific comedy of errors for both Kemper and Newton, and that is, that a *feather* and a *cannon ball* in a perfect vacuum *will not fall* "*with the same velocity*," the opinions of these great scientists, and the testimony of all science, and of all scientific experiments to the contrary notwithstanding; and we will now prove this position so clearly that no amount of sneering in French, Latin, Greek, German, and bad English can prevent the final overturn of the *Principia* upon this matter with Bethany College to assist it.

We assert that the very law of the reciprocal attraction of all bodies in proportion to mass forbids such equal velocity of fall in a feather and a cannon ball, though such a self-evident absurdity has been taught for science in all text-books from the *Principia* down, and has never before, to our knowledge, been called in question since the time of Galileo.

Let us for a moment look at this last paragraph and weigh its scientific announcement. The cannon ball manifestly pulls at the earth in falling in proportion to mass, just as much as the earth pulls at it. In other words the cannon ball pulls itself toward the earth say *one-millionth* as much as the earth pulls it, and in addition thereto, provided the cannon ball is *one-millionth* the earth's mass. Will Bethany College or any other college venture to deny this? But does it follow that the *feather*, which is a million times lighter than the cannon ball, pulls itself toward the earth just as much as does the cannon ball? By no manner of means. To simplify the statement and our criticism; suppose the cannon ball to contain *one-millionth* the earth's mass, and the feather to contain *one million-millionth*. Now while the moon (which contains *one-eightieth* the earth's mass) attracts itself toward the earth *one-eightieth* as much as the earth attracts it and in addition thereto, as Prof. Kemper has "granted," it follows that the cannon ball must also attract itself downward just as the moon does, *one-millionth* and the feather *one million-millionth*, in addition to the earth's attraction! No rational mind can question the truth of this, after attention has been called to it. But as neither a *million-millionth* nor even a *millionth* can be observed by our senses or detected by our finest philosophical instruments, it is therefore impossible for us to distinguish by observation the difference between the rates of descent in the feather and in the cannon ball. But this does not justify our ignoring the mathematical fact that the cannon ball does actually fall faster than the feather in a perfect vacuum; much less does it justify our ignoring the *one-eightieth* in the moon's added fall which is easily calculated and measured. Because Prof. Kemper, like the philosophers at the tower of Pisa, could not detect with a two-foot rule the difference between the rates of fall in a bullet and a ton of lead (which must be vastly less than a millionth) he superficially gives it up as did those philosophers, and jumps to the conclusion that the two must fall with the same velocity!

Let us here and now, clinch the position so it will stay. Let us call the pebble at the moon's distance the unit of mass. Suppose it to be a *million-millionth* the mass of the earth, and that it consequently attracts itself toward the earth with a *force* and *velocity* exactly proportioned to mass; that is, it pulls upon the earth a *million-millionth* as much as the earth pulls upon it, and of course its added velocity in consequence of such pull upon the earth is a *million-millionth* of the velocity produced by the earth's attraction alone. This is so self-evident that no one, it would seem, can call it in question. Take away this reciprocal attraction of the pebble, and you only take away one *million-millionth* of its velocity of fall. But restore this reciprocal attraction of the pebble, and take away that of the earth, and the pebble would then fall by its pull upon the earth with but a *million-millionth* of its velocity—scarcely sufficient to carry it a single foot in a hundred years!

But says the objector; suppose two such pebbles instead of one; would they not continue to fall with the same velocity? And then suppose enough such pebbles collected to compose the entire moon, would not the velocity of such moon's fall be the same as in the case of the single pebble? We answer emphatically *no!* Put two such pebbles together into a single mass, *and you put two velocities together*, as much as you put *two units of mass together!* By adding these two units of mass, of a *million-millionth* each, and the two units of velocity of a *million-millionth* each, you have not only doubled the mass, but you have also doubled the velocity by the double self-attrac-

tion toward the earth! Yes, sir;—ten men can run a mile in one-tenth of the time that one man can run it, if they are all of equal speed, since each man has but a tenth of a mile to run. Ten men, running a mile side by side, will actually run ten miles as truly as if they all started a mile ahead of one another! Do you see the point? Then add a *million-million* of these pebbles together into one condensed mass, with this *million-million* velocities, and you have another earth equal to ours, which will of course pull at this earth with the same force exactly that this earth will pull at that; and as this earth alone would pull that with the same velocity precisely that it would pull a single pebble, of course the newly-formed earth, composed of a *million-million* pebbles, containing a *million-million* units of mass, and a *million-million* units of velocity added together, would fall toward this earth with just double the velocity that it would fall by the attraction of this earth alone; while this earth in turn would fall toward that with the same velocity, thus quadrupling this velocity of approach as compared to the earth's simple pull of a pebble! This is but the well-known effect of action and reaction, as taught in all works on natural philosophy.

Such being true, the science of the whole civilized world is wrong upon this subject of fall *in vacuo*, and has been wrong since the time of Galileo to the present. In the light, then, of this revelation, how pitiable is the closing paragraph just quoted:—

"Why, what can our philosopher be thinking about? Has he never yet heard that *in vacuo a feather will fall with the same velocity as a cannon ball, though their relative weights may be the same as that* [those] *between the moon and the stone?*"

Yes, sir, "our philosopher" had heard of it; but as in a good many other absurdities of so-called science (the *wave-theory of sound* for example), he refuses to bow the knee to this modern image of Baal. He no more believes all to be science that formulates, than he believes all to be gold that glitters; and it will take something more than sneers in half a dozen ancient and modern languages to convert him.

In conclusion, while Prof. Goodenow hastens to write us in substance that Newton had made no such "laughing-stock" of himself as to leave out this *one-eightieth* of the moon's fall in consequence of its self-attraction of the earth, Prof. Kemper declares, just as scientifically, that Newton purposely left it out because he did not wish to be made a "laughing-stock" of! How this "pure mathematics" harmonizes! While Prof. Goodenow charges us substantially with having made a "laughing-stock" of ourself by accusing Newton with leaving out that *one-eightieth* of fall, Prof. Kemper turns and makes a "laughing-stock" of Goodenow by telling him that Newton was right in leaving it out! While Newton really made a "laughing-stock" of himself, according to Prof. Goodenow, by teaching that the moon and a pebble would fall from the same height with exactly the same velocity, when the moon should fall *one-eightieth* faster, Kemper makes a most conspicuous "laughing-stock" of himself by telling us that it would add *one-eightieth* to the fall of a pebble at the moon's distance if another pebble of the same size were to be added to the earth! And he doubles this "laughing-stock" upon himself, first by agreeing with us and then with Newton, and finally by asking in his grandiloquent style, if "our philosopher" had never heard of a certain scientific fact, which we have just proved to be no fact at all, but a scientific absurdity!

Prof. Kemper has thus voluntarily become the "substitute" which he thought "Nature" might possibly "furnish after many efforts," and no thanks to such a slow process of producing "laughing-stocks." He has done this, no doubt, to convince us that the "mathematical devil-fish" which had "captured the editor of THE MICROCOSM," could perform the remarkable feat of converting himself at a single "effort" into a full-grown "laughing-stock," with as many heads as the "devil-fish" has antennæ, and that too before "Nature" would have time to say "Jack Robinson!"

Next!

AN INTENSE SOUND.

On the 18th of last month there was a very intense and destructive *sound* occurred in Passaic County, N. J., about eight miles from Patterson. The *sonorous wave* originated in Laflin & Rand's powder works, by the accidental burning of fifty kegs of powder, and so intense and piercing was the *sound-pulse* that it shattered and scattered the two powder mills, leaving not one timber or stone upon another that was not torn down. But the more lamentable part of the effect was that this powerful *noise* was so *loud* that it killed three workmen who happened to be near the works at the time, tearing them into fragments and scattering their remains over acres of ground; and for three miles in every direction the *sound-wave* broke in windows and doors and crushed glass much farther away!

The above is a detailed description of this explosion, such as would have been written by Professor Tyndall or Professor Mayer, and a *fac simile* of the account which would have been recorded by more than one thousand eminent college professors, had they been present, who are now teaching their classes in physical science in the various colleges and universities, just such nonsense from our standard text-books, and imposing it upon tens of thousands of young men as science!

Let us undertake to describe it according to the principles of true science and common sense, and see how it will look:

The explosion of fifty kegs of powder instantaneously generated tens of thousands of cubic yards of gas which, in expanding, drove the surrounding atmosphere away in all directions with tremendous force, compressing it into an intensely condensed air-wave, which condensation necessarily traveled with such frightful velocity that it not only destroyed the two buildings in which the explosion occurred but tore the three workmen therein to pieces. This condensed air-wave, owing to the atmospheric displacement caused by the sudden addition of such a quantity of powder-gas, retained sufficient power and velocity even to break in windows and doors three or four miles away. Incidental to this explosion and the destructive air-wave produced by the added gas, there was a deep and intensely loud sound which accompanied the atmospheric compression, traveling so nearly at the same velocity that some superficial persons who do not stop to reflect really supposed that it was actually this sound-pulse that broke the windows at a distance, and consequently that the sound also must have been that which destroyed the two powder mills and tore the three men to pieces. But as this childish idea is only to be found in such unreliable works as those of Tyndall, Helmholtz, and Mayer, it is confidently hoped that such views of science will soon pass away. Young students of our colleges, therefore who are lamenting their circumstances in being forced to listen to such fallacious instruction, and who are beginning to make bold to urge their professors to teach them common sense in place of such stuff, may take heart. Those professors are mostly middle-aged or older, and will soon give place to the rising generation who will not find it so difficult to step out of the beaten ruts of puerility because it happens to be taught as science in our text-books. So mote it be.

REV. DR. SWANDER'S PAPER.

We owe almost an apology to our readers for the appearance of the article from the pen of the Rev. J. I. Swander, A. M., in another part of this number of THE MICROCOSM. But for its deep scholarly tone, and its marvellously beautiful literary style, we would not have felt at liberty to print it, owing to its undisguised complimentary reference to ourself. We have turned away from our microcosmic door scores of similarly flattering articles, because they were from old and intimate friends. Our chief excuse, therefore, for giving room to this exquisite piece of English composition is the fact that personally we do not know Dr. Swander at all, having never met him, and only know of him as do our readers, generally by seeing the splendid literary productions of his pen.

We will only add that in some important respects we are not our own, but consider that we belong—with THE MICROCOSM—first to our subscribers and then to the world, for both of whom we are laboring and in whose interests we expect to wear ourself out. For this reason we frankly hold that they have a right to know what we are doing, as viewed by outsiders, and what effect our work is having upon the minds of thinking, educated men whose unselfishness will allow them to express their opinions of us and it over their own signatures. As a duty to the public, therefore, and without the slightest tinge of personal vanity, as we here aver, we have deemed it but proper occasionally to let these frank opinions of the friends of the cause we advocate go before our readers. This is our apology.

Next month we will give Dr. Swander's "Open Letter" to Professors Tyndall, Helmholtz, and Mayer, in which their silence in regard to the sound-theory is placed in the focus of a calcium light. This light will enable those distinguished scientists to see themselves as others see them.

A SINGLE COINCIDENCE.

Prof. W. L. Tower, of Oakland, Oregon, writes us:—"The chief reason why I subscribed for THE MICROCOSM was that it contained a discussion of the gravitation law. We want light on this subject, and desire all the facts we can get. We know, of course, that there is a resemblance to accelerated fall in the moon's departure from a fixed tangent, especially for a short distance. But surely Newton's vaunted law of gravitation must have something more than this *single coincidence* for its basis! If not, it shows an immense superstructure reared upon a very diminutive foundation."

Positively, Prof. Tower, this "single coincidence" is the entire foundation of Newton's great law. Yet this coincidence, as we saw last month by proofs from the *Principia*, had to leave out entirely the *one-eightieth* of the value, caused by the moon's attraction of itself toward the earth, in order to make this appearance of acceleration as much of a coincidence as it is.

THE COMMON CENTRE OF GRAVITY.

We expected to present in this number a discussion of the received doctrine of the *common centre of gravity* of the earth and moon as the point around which both earth and moon revolve. But we are looking for a condensed argument upon the general subject of gravitation from Professor Goode now for the February MICROCOSM in which probably this question of the common centre of gravity will be definitely stated and argued. In that event our new position, as well as our objections to the old view, would be more appropriate and also better understood by our readers.

AIR-STRATIFICATION.

MEDORA, Ill., Dec. 18, 1882.

A. WILFORD HALL, Ph. D.; EDITOR MICROCOSM.

Dear Sir: Since your *war* against the wave-theory and especially sound-interference began, I have been a careful reader both of the "*Problem of Human Life*" and the "MICROCOSM."

I am especially interested in your "Air-Stratification" theory. As to the transmission of sound through the air under the following conditions I respectfully ask a little light.

I am in bed every night at 10.30 o'clock. At 10.50 o'clock the night express train from St. Louis passes this station, a quarter of a mile, perhaps, away. After the din caused by the puffing of the engine at starting, the sound of the train is scarcely audible until it reaches a certain point half a mile north. When it passes this point a loud, rumbling sound—similar to that of thunder—is given out. The rumbling is heard for about ten or twelve seconds, when it suddenly ceases and it is impossible to distinguish a sound from the moving train for the space of three minutes, when suddenly again the rumbling is heard; this time somewhat fainter than in the first instance. For a few seconds only the distant whir is heard, and then all is silent. Nearly every night—*every* night when I'm at home and the train is on time—I hear these sounds. The direction of the wind makes very little difference. They are produced at the same time and at the same points night after night.

The "air-stratification" theory does not, I think, explain this. The strata are, according to the theory, constantly changing their relative positions so that it would be impossible for them to be in a position suitable to conduct these sounds in the same manner in every instance.

Please explain and oblige a "STUDENT."

REMARKS.

"*Student*" is undoubtedly right. This is not a case of "Air-Stratification," but rather, most probably, of *ground*-stratification. It might occur where there were undulations, or ridges and hollows in the soil which might serve for conveying the sound from distant points like partial tubes or troughs; or there might even be strips of woods to do the same thing, and thus convey the sound between them at certain points while cutting it off at others. But in the above described instance there is very little doubt but that the strata of the earth, such as layers of rock or water beneath the soil crossing the track, at certain points, form better sound-conductors to distant points than at other portions of the ground over which the trains pass. If "Student" will examine carefully into the geological structure of that region he will probably find a correct solution to his problem as here hinted.

THE CHRISTIAN STANDARD.

Up to going to press we have seen or heard of no notice of our reply to the *Standard* in last month's MICROCOSM. The *Standard* agreed to publish our reply if we would publish the *Standard* article complete, which we did the month previous. Why is our reply withheld? Will the *Standard* answer?

"MICROCOSMIC DEBRIS."

We give a page of this favorite reading matter in this number of THE MICROCOSM, by request of many readers, and will, when possible, keep it up in future numbers.

NEWTON'S GREAT OVERSIGHT No. 3.

This paper on gravitation is laid over till next month, owing to the length of our reply to Prof. Kemper's long article in the *Standard*. Then, there will probably be a condensed article upon the subject from other sources, which may call out other editorial replies involving other arguments, or not imposibly involving modifications of some of the positions and views as presented in former articles. The question of the reciprocal attraction of spheres, as relates to the operations of the system of the physical universe, is a complex one, and not to be mastered at a single mental effort, but requiring cool and careful study.

MICROCOSMIC DEBRIS.

—There are eleven hundred and sixty-five lawyers in Boston.

—Dean Stanley said: "The best remedy for all evils is to look forward."

—Aligator fat is now used for cooking purposes in some parts of Florida.

—A Pittsburgh firm is turning out glass slabs for use on furniture in lieu of marble.

—More than $6,250,000 worth of ostrich feathers are exported from South Africa annually.

—The Prefect of the Seine is going to remove from the gates of cemeteries symbols not accepted by persons of all religious persuasions.

—Plumpness, milky whiteness of complexion, puffy eyelids, and swollen skin, mark emphatically the arsenic-eater, says a Cleveland physician.

—There is a farmer in Ohio who has not sheared his sheep in five years, because, as he claims, Providence intended the sheep to wear their wool.

—The Queen of England regards with satisfaction the fact that the tricycles which have been used by her grandchildren have helped their health.

—A stone weighing eighty-five pounds recently fell at Salina, Kansas, and another, cigar-shaped, four inches in diameter and over twelve inches long.

—Sixty-one thousand acres more of Adirondack lands have been sold to men who will strip them of their timber and spoil them for hunting and fishing.

—Buffalos in Dakota scratch their ponderous foreheads against the telegraph poles so vigorously that much damage and inconvenience are caused to telegraph operators.

—The Washington monument has now 168 courses of stone and is 336 feet 5⅞ inches high, or 2½ inches higher than the top of the figure of America on the Capitol.

—A quart of cream can be kept perfectly good for months in the highest temperature by an ounce of boro-glyceride. Prof. Barff proposes to save railroad carriage for milk by condensing it in the country and mixing it with boro-glyceride, so that it has only to be mixed with water when needed.

—Queen Victoria invariably transacts her public business between breakfast and luncheon, and hardly once in a month does she concern herself with public affairs at any other time.

—Sir Isaac Newton said that infidelity would probably prevail until it had quite banished superstition, but then would be swallowed up by the great light and evidence of true religion.

—A colored man, while ploughing near Opelousas, La., a few days since, struck a ten-gallon jar, filled with Spanish silver coins of date of 1779. The amount is estimated at $8,000 to $10,000.

—There is an apricot tree in Fresno County, Cal., that measures sixty inches around the trunk three feet from the ground. It is estimated that there is not less than a ton of fruit on the tree.

—In the northern part of Chester County, Pa., the farmers' boys use snake skins for cart whips. They find the snakes six feet long, and their skins being preserved a while in alcohol, make excellent whips.

—The Russian Minister of Education finds the experiment of giving elementary instruction in medicine in the municipal schools of the capital answer so well that he has authorized its extension.

—Philadelphia is running water pipes for drinking and culinary purposes through common sewers, and thus subjecting the household water supply to the risk of poisoning. The Health Board protests, but cannot stop it.

—An air-tight clock is being made for Wesleyan University. It winds itself by means of an electrical apparatus; and as the air is exhausted from the case when it is started, atmospheric disturbances are avoided.

—The rate of vibration of the rattlesnake's tail has been determined by Dr. Ott to be sixty per second. The method of experiment was to attach a pen to the snake's rattles, the record being received on a revolving drum.

—A marriage at Dover, N. H., was of a couple who plighted troth twenty years ago. He has been after his fortune in Colorado gold mines and she has been teaching patiently at Dover, love letters going to and fro all the time.

—A Dublin woman has been for years drawing money from the public charity fund, and food from two private charities. The money she has lent at usurious rates, and the food she has sold, and added the proceeds to her banking capital.

—The old State House in Boston, Mass., has been once more adorned with the lion and the unicorn, the British emblem having been placed upon the façade of the building as a part of the work of restoration. The figures are of wood, painted lead color.

—It has been decided in England that the telephone business of the country shall not be exclusively managed by the Post Office Department, which now controls all the telepraph lines, and it will be allowed to remain in the hands of private individuals.

—Fanny Kemble says that Disraeli told her he thought Dublin should be burned down. He could see the use of London and Paris, but not of Dublin. Disraeli never visited Ireland, though he directed its government for eight years, and it was within twelve hours' travel.

—The first letter written by Queen Victoria after her accession was one of condolence to her aunt, Queen Adelaide. She addressed it to "Her Majesty the Queen." It was submitted to her that "Dowager" should be added. "I will not be the first to remind her of her altered position," was the reply.

—During the first five months of this year no less than 5,000 tons of Italian produce, eggs, butter, vegetables, etc., have been imported into Great Britain. This trade will undoubtedly be increased by the quicker transit consequent on the opening of the St. Gothard.

—What promises to become the largest iron furnace in the United States has grown up quietly in the Virginia mountains, and is now nearly ready to be put into blast. It is in Rockbridge county, will produce 200 tons of iron daily, and belongs exclusively to English capitalists.

—A club is about to be established in London composed exclusively of members of the press. Its President is George Augustus Sala, and Dr. W. H. Russell and other well-known journalists have given their adhesion. It is somewhat similar to the Press Club here and in Paris.

—The King of Greece speaks English, French, German, Greek, and Danish. Their Grecian Majesties in conversing together use the German language, in speaking with their children they employ English, and they speak Greek to the general household in the various royal residences.

—An Italian statistician has just made a discovery that every human being at present living upon the face of the globe has the undoubted right to claim descent from no fewer than one hundred and thirty-nine thousand two hundred and forty-five billions of ancestors, only as far back as the commencement of the Christian era.

—Although Philadelphia does not move quickly herself, she seems to be the home of motors. Mr. J. R. Blumenberg (the purchaser, not the inventor) is now dazing the Philadelphia mind with a miracle of ingenuity, which takes the wind compietely out of Keely's sails, and will enable an ordinary house fire to run an ocean steamer. Bisulphide of carbon is the main material used.

—Dr. Brinton does not take stock in Mr. Herbert Spencer's remarks about Americans killing themselves with overwork. He says that the life insurance companies, whose purpose it is to get testimony for business uses rather than for after-dinner speeches, show in their tables that the expectation of life is in this country rather better on the grand average than in England, France, or Germany.

—The right of a woman past the age of 21 to marry whom she pleases has just been vindicated in Missouri. The father of Laura Robbs, aged 27, attempted to hold her to continued service in the paternal home by locking her up in a room when she had made a verbal contract to become the wife of George W. Bishop. A writ of habeas corpus unlocked the door, and the marriage took place in spite of the father's objections.

—Young men who call their fathers "Governor," without intentional disrespect, will be surprised to learn from the Rev. Dr. Irenæus Prime that they are guilty of bad manners. He says that they illustrate the increased irreverence for age, and a marked decline in respect for the aged. "There is no use in telling me," he says in the *Observer*, "that parents, teachers, and officers command as much respect as they ever did, and just as much as they deserve. I know better."

—On an express train running between Victoria and Brighton, England, are four Pullman cars lighted with incandescent lamps, supplied with electricity from Faure accumulators. The cars have electric bells also, by which the conductor or page boy may be summoned. The "covered gangway," by which the conductor may pass from car to car, is mentioned as another feature of the train.

WILFORD'S MICROCOSM.

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AN OPEN LETTER.

(BY REV. J. I. SWANDER, A. M.

TIFFIN, OHIO, Jan, 1, 1883.

Prof. JOHN TYNDALL, London, England,
Prof. H. L. F. HELMHOLTZ, Berlin, Germany, and
Prof. A. M. MAYER, Hoboken, N. J.,

Gentlemen:—Hoping that you will excuse the seeming impertinence of this communication, I assume the responsibility and enjoy the pleasure of addressing you, severally and collectively, in a matter of grave importance to yourselves, as well as to the scientific world at large. If, on the first reading of this epistle, you should be disposed to look upon its author as unwarranted in the felicitous liberty he now enjoys of addressing such distinguished personages, I hope that you will not be unmindful of the fact that we are kindred in the cause of science, and can afford to waive some of the formalities of social etiquette in order to promote the triumph of eternal truth.

I wish to address you more particularly concerning a question in the science of acoustics in which, by your lectures and writings, you have won for yourselves reputations as wide as the literary world, and as lasting as the foundation upon which you have built the superstructure of your scientific renown. Permit me to inform you, however, that concerning the firmness of said foundation, owing to the questionable qualities of its material, there is considerable doubt. Until recently, the wave-theory of sound was regarded as permanently established; but a sudden change has disturbed the tranquility of our dreams. A new theory has been projected, which, if proven correct, will have the effect of setting aside very much of what you have taught for science, as well as what your disciples have hitherto taken for truth. The disturber of our peace is A. Wilford Hall, 23 Park Row, New York City. In a book entitled *The Problem of Human Life*, he has had the courage to assail the undulatory theory, notwithstanding it has been so ably advocated by yourselves, so readily incorporated into the acoustical text-books of the age, and so generally taught in the educational centers and circles of the world.

Having reason, Gentlemen, to conclude from your unbroken silence upon the subject that you have never heard of the said Hall, or having heard of him, have failed to form a proper conception of the disturbing quantity and quality of his writings upon sundry topics in science, I take the liberty of informing you that such a man really exists. I inform you further that he does not trace his lineal descent to the zoological garden, but to the garden of Eden. He is an American by birth, a Christian by profession, a gentleman by the nobleness of his nature, a versatile scholar by virtue of his diligent search for the truth, and a living syllogism by his logical endowments of intellect. His writings are the object of general interest, and the subject for warm discussions. In his *Problem*, according to popular opinion, he has made the most masterly argument of the century against the preposterous claims of atheism; he has demonstrated more clearly than any man of his race the possibility of bringing life and immortality to light through science; he has assailed the traditional theory of sound with such terrible blows of plausible reasoning as to dethrone the god of your scientific idolatry, and impeach both the intelligence and sincerity of its worshipers.

To be a little more explicit, I would inform you that the author's attack upon the theory in question is a most radical onslaught. He spares neither root nor branch. He reviewed your respective writings on the subject of sound: he dug around the foundation upon which the theory is built: he examined the claims of its pretentions to intelligent honesty: he arrayed one part against another, and used each section to disprove the truth of all the rest: he passed through every longitude and latitude of the field, and analyzed every argument upon which your apocryphal gospel is made to depend. Indeed, he has threatened to raise the very *wind* upon which your theory of sound hoped to subsist. Such vandalism would be intolerable were it not that he proposes to substitute something better. He lays down a new law for the generation and propagation of sound. He avers that it has a substantial existence, and that it consists in corpuscular emissions; that air is only a medium of its conduction, and that "any motion of such medium, caused at the time by the vibration of the sound-producing body, is but incidental." No adequate idea of the author's position can be given you by quoting from, or commenting upon the aggressive treatise now challenging your attention.

Yes, Gentlemen, the new theory challenges *your* attention with a defiance you dare not despise. Does not the scientific world look upon you as the champions of the doctrine thus vigorously assailed? Would you have your darling theory laughed out of countenance, and its fair face filled with the lineaments of shame? Is the world unreasonable in expecting you to vindicate your own honor, even though you should be obliged to abandon the miserable fallacy forever? Do you deny that your position has been assailed by a formidable foe, and that the walls of your *air*-castle are actually crumbling before the irresistable catapults of truth? I pray you to dissipate the dark delusion. Do you think that the storm will soon pass over, and leave tranquility upon the surface of your favorite sea? If so, you entertain a thought more deceptive than flattery, and commit a blunder more unpardonable than crime. Do you think that Dr. Hall is unworthy of your notice because he has not stepped upon the polemic stage bound by creeds and badged with literary titles? Away with such false pride! If you really desire to display your skill in defence of the truth, step into the arena without delay. As you have a cause worthy of your valor, I promise you a foeman worthy of your steel. The American people honor you for your interest in the cause of science, and cherish a singular admiration for that rare ability by which you have been able to make fallacy appear more plausible than truth; but they do not admire your silence in this critical hour when one blast from your bugle would be worth ten thousand men—especially if your bugle-blast were to produce something a little more substantial than air-waves. Come, Gentlemen, get out of your hiding-places. If you have been wrong, confess your error. Other great men

have grown greater by such a course. If you are right defend yourselves. Do not stand upon false dignity because your assailant has, until recently, been unknown to fame and fortune. This is no time to plant your silenced batteries behind the *ram*parts of your literary renown, and thus hope to dispel the darkness of error by the dazzling splendor of your diplomatal sheep-skins.

Dr. Hall has laid the challenge at your doors, and expressed his prediction in the following language: —"The condensed air-wave, or atmospheric concussion which breaks a window at a distance from an explosion of powder will be found, when tested, to be altogether a different effect from the sound produced by the same explosion, and that it [the air-wave] will also be found to travel at a different velocity, which velocity will be in proportion to the quantity of gas added, and the distance the condensed wave has traveled." Should the above prediction be justified by a fair and full demonstration of its truth your theory must fall under the ban of righteous condemnation. The test is to be made by gunpowder. The occasion promises to be one of greater importance to science than the little gunpowder experiment made upon this continent one hundred years ago. That was the trial of a nation's right to freedom from foreign domination; this will test the right of truth to be free from the shackels of a most monstrous fraud. Come over, Gentlemen, and witness the grand display. Your presence is affectionately solicited. The founder of the corpuscular theory has donated a ton of gunpowder to test the truth of his doctrine. Matchless magnanimity! What will *you* give to prove the truth of your voluminous writings? Come to judgment, Gentlemen. The vicinity of New York City has been named as the proper place to erect the judgment-seat, and next June as the judgment-day. If you do not choose to come, look out for the sound of the trumpet.

Do not be discouraged by the numerous desertions from your ranks. There are men in this country who will continue to follow you—truth or no truth. The prestige of your theory is in your favor. Some of our leading educators declare that they will continue to advocate it, not for any merit it is known to possess, but because it is laid down in the text-books, and more easily taught than the new doctrine of substantial sound-pulses. Perhaps you need money to encourage you in the trying ordeal through which you are now called to pass. Let me call your attention to a standing offer of $10,000 to any man of acknowledged literary ability like yourselves who shall successfully defend the wave-theory against the attacks of A. Wilford Hall in *The Problem of Human Life.*

But you must act without further delay. The rank and file are becoming impatient for battle. The *Presbyterian Review* gives notice that "our precious religion" is defended by "ignorance," and if these days are not shortened the very elect are in danger of being seduced. *The Reformed Church Messenger,* one of the staid religious journals of this country, and which, for fifty years, has been advocating the doctrine of *progress* in science, with constant emphasis upon the objective nature of invisible entities, has somersaulted itself over to your standard with a remarkable dash of courage. In a recent article one of its editors complains that the founder of this new philosophical system was made the recipient of a well-merited title of honor from one of the rising literary institutions of this country. In the same article the new sound-theory was criticised with a gallantry equalled only by the fog in which it was enveloped. Perhaps *you* can penetrate the mist and appreciate the force of his argument. It was in substance:—The wave-theory must be correct, because no sound can be heard from a music-box in a receiver exhausted of air. The article showed great zeal for the old paths in science, but left the readers to doubt whether the music-box was in the vacuum, or the vacuum in the editorial music-box.

Have you anything to say, gentlemen, and do you wish a medium through which to speak to the intelligent thinkers of this progressive age? There is such a medium at your command. I am authorized to tender you the pages of the MICROCOSM, a monthly journal, published in New York city, devoted to the discoveries, theories and investigations of modern science, and eagerly read by 50,000 literary freemen. It if edited by A. Wilford Hall, the very first man to be converted from the error of his ways, provided you can show that his ways are erroneous. His readers, with few exceptions, are in sympathy with his corpuscular theory of sound, and in search for the truth. Have you the truth, gentlemen? If so, let the sun of truth now shine in broad, bright splendor over the earth. "No *man* lighteth a candle and putteth it under a bushel." The MICROCOSM is at your service without money and without price. You shall have, not only a fair chance to speak, but also an attentive hearing and an impartial verdict from a people proverbially fond of fun and fair play.

Fraternally and affectionately yours,

J. I. SWANDER.

"THEISTIC EVOLUTION."

BY PROF. I. L. KEPHART, A.M.

Is there such a thing as theistic evolution? Does evolution *per se* admit of the existence of or leave any place for an Omnipotent, Omniscient, Eternal God, the maker and upholder of all things? Certain eminent divines who have espoused the evolution faith claim that it does, and that the evolution theory is but a special revelation of the divine method of creation. They also claim that its teachings do not conflict with the fundamental doctrines of the Christian religion. But what are the facts!

Evolution teaches that in matter alone are to be found all the causes that have given existence to all the material forms of the Universe, and that matter is eternal. It teaches that from the remote, eternal molecular atoms and their self-evolving force, have sprung, *unaided by any higher intelligence,* not only the diversified material forms both organic and inorganic, but even all the varieties of vegetable and animal life, including instinct, reason and intelligence. A fundamental feature of its teaching is that in Nature alone—that is in the materials that exist and their self-instituted laws of motion and "survival of the fittest," we find a complete explanation of all the phenomena of the universe, thereby completely ignoring the supernatural. Hence, according to the fundamental principles of evolution as taught by its great disciples, Spencer, Helmholtz, Huxley and Darwin, if the God of the Bible does exist there is no use for Him whatever, and no part of creation with which man is or possibly can become acquainted, is of His designing or workmanship. The ten thousand manifestations of design which greet the intelligent eye at every turn in life and in all organic forms, are but

the result of happy accidents. Intelligence had nothing whatever to do with constructing the eye, the ear or any other organ of the body, except only in so far as intelligence inheres in matter itself, and has so inhered in it eternally. That I do not overstate or misrepresent the teachings of evolutionists, any one can satisfy himself by examining their standard works.

Now, this is no new doctrine. It is as old as the days of Democritus. Four hundred years before Christ he promulgated this theory; and instead of modern evolutionists advancing anything new, they are, in fact, only elaborating an old atheistic dogma that was promulgated more than twenty-two hundred years ago. Hence, in this particular, they have not evoluted very much. But the surprise is that eminent divines who claim to be orthodox, will boldly claim that a teaching which absolutely leaves no place in the range of rational or material existence for the God "who upholdeth all things by the word of His power," who numbereth the hairs of our heads, and without whom not even a sparrow falls to the ground, should subscribe to that teaching as being in harmony with the fundamental doctrines of the Bible, and presume to persuade intelligent men into accepting such a belief.

The Bible which they claim to believe, and of which they claim to be divinely commissioned expounders, declares that "God created man in His own image," that He endued him with reason and intelligence, and that on account of his violating his Creator's laws—laws whose requirements were founded in the essentials of man's well-being—he *deteriorated* into a lower condition than that in which his Creator originally placed him; and that the grace and Gospel of the Lord Jesus Christ is the only agency capable of effectually restoring him to his primal intellectual and moral excellency. But evolution teaches that man had his physical, mental and moral origin all in the moneron—that by certain *accidental* combinations of molecules of matter the moneron came into being; and that from it, by means of millions upon millions of differentiations and evolutions which it required millions upon millions of ages to accomplish, higher and still higher forms of animal life were evolved, a gradual process of improvement going on all the while, until in the evoluted brain of the higher forms of life a gleam of reason was evolved, which continued to brighten through the infinite ages until it finally blossomed into judgment and intelligence; and hence the man of the present day exists. Evolution teaches distinctly, that through the operation of the inherent forces of matter alone, and by means of "development" and "the survival of the fittest," man, in his present state, has been gradually evolved from the very lowest forms of animal life.

We admit that the theory looks nice as an appendix to the nebular hypothesis; but the question for solution is, does it accord with the teachings of the Bible? does it accord with the facts of history? does it accord with the ascertained facts of science? As to the Bible, it requires but a small amount of scrutiny to reveal the fact that this theory is in direct antagonism with its plainest declarations; and that nothing short of a gross perversion of these declarations can possibly give them even a semblance of agreement with the evolution hypothesis. Evolution is essentially materialistic and atheistic; the Bible is directly the opposite of these.

As to the facts of history do we find in them evidences of this ever-increasing development and improvement in man, except where he has been under the direct influences of the teachings of the Bible? What improvement physically, intellectually or morally have the Chinese made since the days of Confucius? In fact that nation has stood petrified as to improvement for the last three thousand years. Its progress has been nothing. Only since it has opened its ports to the Bible and to the commerce of Bible-reading nations, has it begun to make any improvement on the customs and manners of the days of its great prophet. What can be said of the intellectual and moral improvement of the Egyptians, the Syrians, the Babylonians, the Medes, the Persians, the Greeks and the Romans? All these nations had at one time attained to great intellectual eminence. This fact is well attested by the fragments of their literature and customs that have come down to us. But have they, according to the evolution hypothesis, gone right on, and by means of survival of the fittest, are they now, as they once were, in the very front rank of intellectual and moral excellence? Is it not strange that with such well authenticated evidences of the fallaciousness of the claims of evolution right before their eyes, intelligent divines will yield assent to its propositions?

From whence have come the nations that to-day constitute the brain-power of the world? From what people have sprung or have been "evolved" the superior morals of Christianity that are blessing and conquering the world? Not from those intellectual giants that once held the Hebrews as slaves. By reason of their receiving, and adhering to the teachings of the Bible, one of the fundamental tenets of which is the declaration that about six thousand years ago "God created man *in His own image*," there has sprung from the tribes of northern Europe who less than two thousand years ago existed in a low state of barbarism and savagery, the intellectual and moral men and women who are to-day ruling and blessing the world. Without the moral restraints of the Bible, even intellectual Greece and Rome, instead of evolving into a higher life, deteriorated and died of their own moral rottenness. But, aided and restrained by the words of the Bible, the savages of northern Europe have in a few centuries, risen to the highest degree of modern, intellectual and moral culture. What a commentary these *facts* are on the pretentions of the evolution theory! And the attempts of certain progressive (?) divines to so explain away the emphatic declarations of the Book of books as to make them accord with the evolution theory is humiliating and disgusting in the extreme.

As to the pretentious claims of evolutionists that their theory is substantiated by science, and that it is scientific, it is simply not true. With all their research and with all their claims, they have utterly failed to produce any *facts* of science to substantiate their claim that man has existed on this earth more than six thousand years. Nor have they been able to produce facts that come within a thousand leagues of connecting man, by descent, with the lower order of animals. Even between him and the most intellectual (?) monkeys of modern times they must acknowledge that they have utterly failed to discover "the missing link." That "*link*," even with them, is the great desideratum of their theory, and that link they have not found. Until evolutionists unmistakably produce this link, divines should be slow to admit that they are lineal descendants of monkeys.

although their illogical reasoning and inconsistent behavior might be taken as a strong proof that they are thus descended. Agassiz and Lyell, than whom there are no higher authorities respecting geologic remains, both assert that there were successive *creations* from the lower to the higher forms; but as emphatically assert that *they were creations* and not mere evolutions or differentiations. The claim that evolution is an established fact, and that theology must be so modified as to accord with it, is as false as it is pretentious. And as to so modifying theology as to make it accord with evolution, it is utterly impossible. The former is essentially theistic, the latter essentially atheistic. To indorse evolution is to abandon the theology of the Bible in every shape and form. No more can the Helmholtz-Spencer-Huxley-Darwin evolution of to-day be made to harmonize with the essential teachings of the Bible, or the theology of the Book of books be made to harmonize with evolution than the Apocryphal lake of fire can be made a safe place to store gunpowder.

WHERE ARE HEAVEN AND HELL SITUATED?

OBJECTIONS TO PROF. DOZIER'S "PHILOSOPHICAL CONSIDERATIONS."

Editor MICROCOSM:—

I have read the above article which appeared in the December MICROCOSM with considerable care and some measure of interest. The subject is not of much practical import; but as there is both novelty and plausibility in the article, I would humbly venture to suggest a few trifling objections. Allow me to say, as a preliminary remark, that I have no sympathy whatever with that righteousness of life which is based on Heaven and Hell considerations. Right is right even if there were no heaven. Wrong is wrong even if there were no hell. It is superlative selfishness, therefore (and consequently antagonistic to the teaching and practice of Jesus Christ), to shun vice because it leads to hell, and practise virtue because it leads to heaven. If heaven and hell were myths, the obligation to live in harmony with the principle of righteousness would still be on us.

"For right is right since God is God,
And right the day must win."

My first objection is, that Prof. Dozier in his article practically abolishes a present heaven. Where does Jehovah now have His throne? Where are the holy men and prophets of old? Where are the noble army of martyrs? Where are those angelic beings who bow in adoration in the presence of the Eternal and say "Holy, Holy, Holy is the Lord God of Hosts?" Where is Jesus Christ? He said to His disciples shortly before He suffered, "I go to prepare a place for you. I will come again and receive you to Myself, that where I am there ye may be also." How did He "go"? By remaining on the earth? Let us see. "And it came to pass while He blessed them, that He was parted from them and carried *up into heaven.*" (Luke xxiv: 51.). "While they beheld He was *taken up* and a cloud received Him out of their sight." (Acts i: 9.). I am not now contending for the *direction* in which heaven is located, but only that Christ *left this earth* and went to heaven wherever it is, and that He is to come again and receive all the finally faithful unto Himself, that they may occupy the place He has prepared for them. The future heaven of the righteous, therefore, cannot be on this earth. There is a singular lack of anything in the shape of Scriptural evidence in Prof. Dozier's article when he seeks to prove that this earth is to be the future heaven of the righteous. I do not say it will not be, but only that I want more light before I can believe it.

My second objection is of a mathematical nature. There is no way of getting at the statistics; but as Prof. Dozier's article is largely imaginary, I must have imagination to help me at this point. I think therefore of the thousands of millions of righteous persons who have lived and died from the beginning of time till now; and of the thousands of millions who may live and die between now and the day of judgment; and to these are to be added all the hosts that are at present in Heaven—"a multitude that no man can number." Of course all those who are now in Heaven must come to this earth (if Prof. D's hypothesis be correct), because Christ, as we have just observed, said to His disciples that where He is there they must be also. I submit, therefore, that there are very strong reasons for doubting whether this earth could accommodate such a vast multitude.

My third objection is that the Professor's article practically abolishes a present hell. There is a hell *now.* The Scriptures do not refer to one that is to be created. Where do "the devil and his angels" hold their court? Where do the spirits of the wicked go at death? Their bodies are laid in the grave, but where do their spirits go? Wicked spirits cannot go to Heaven, and where else can they go but to—the moon? That is to be the future hell of the wicked, according to Prof. Dozier. I should think that such a belief is entertained "by only an insignificant portion of the civilized world." But I must be fair with the Professor. That the moon is to be the future hell of the wicked, he only gives as a "supposition."

But Prof. D. hints that God fitted up his barren waste (the moon) for other and more far-reaching purposes than merely as a reflector of the sun's rays." That is, when as yet there were, so far as we know, "no devil and his angels," God created the moon (Gen. i: 19) in anticipation that it might be needed by them. Clearly this will not do. Beside all this, the capacity of the moon is far too limited to accommodate the thousands of millions who have lived and died in wickedness.

JACKSON, TENN. DAVID LEITH,
Pastor 1st M. E. Church South.

REDEMPTION.

FROM A SEMI-RELIGIO-PHILOSOPHICAL STANDPOINT.

BY ELD. J. G. BURROUGHS.

(Concluded from last month.

The necessity of Jesus' suffering may be again illustrated from the well known law of *Similia.* In the science of medicine there is no law better established than the homœopathic law—*Similia Similibus Curantur*—like cures like. This law holds equally good in redemption. Death—physical—had obtained among men. Nothing was found in the universe to antidote it but death. Hence, Jesus died, "the Just for the unjust, that He might bring us to God." Thus we see that the death of Jesus met and antagonized the death of

man. Therefore, as Bro. Paul says: "Since by man came the death; by man came also the ressurrection of the dead." (1 Cor. xv:21.)

The *necessity* of the death of Christ gave rise to a trialism of trialities; that is, to a threefold series of trialities, viz.:—

I.—The advent and incarnation of the Word.

II.—His baptism and temptation.

III.—His ministration.

We have again, therefore:—

I.—His betrayal into "the hands of wicked men."

II.—His arrest.

III.—His trial and adjudication unto death; and therefore, as before shown:—

I.—His death.

II.—His burial.

III.—His resurrection.

This last trialism gave rise to a dualism, or a twofold system of trialities, as follows, to wit:—

I.—Jesus' triumph over death.

II.—His triumph over Hades.

III.—His victory over the grave.

His victory over this triality of powers begat:—

I.—An unconditional deliverance of *all* men from the Adamic sin.

II.—*Conditional* deliverance of *all* men from their own sins.

III.—An unconditional deliverance of *all* men.

a.—From the sting of death.

b.—From the power of Hades to retain their souls.

c.—From the power of the grave to retain their bodies.

In this age of boasted wisdom, knowledge and power, we hear much of the works and creations of Nature—as if *Nature* was the creative power residing in the universe. But, Nature creates nothing. She has no creative power, vested, nor inherent. She only *develops* that which is already created. And the power to *develop* is vested, not inherent.

"In the beginning God created—made, or formed—the heavens and the earth, and all that in them is." It was then that God addressed the Logos and said: "Let us make man in our image, after our likeness." (Gen. i:26). The term *man* was used generically—with reference to *all* men, As evidence of the correctness of this idea see the following, to wit: "And let *them* have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth. (Gen. i:26). Again, "So God created man in His own image; in the image of God created He him; *male* and *female* created He *them*. (Gen. i:27). Thus it is evident, if there is any logic in language, that God created every member of the human race, in embryo or germ, when He created Adam. And thus we reason concerning every family, order and species of the animal and vegetable kingdom; that is, that every individual member thereof was really created, in germ, when the *first* was created.

Our reasoning concerning the human race gives coloring to the following couplet which has been so often ridiculed, viz.:

"In Adam's fall,
We sinned, all."

With this, again, agrees the Pauline theology, which teaches that, "Death passed upon *all* men, for *all* have sinned." Paul. (Rom. v:12.)

As further evidence of the correctness of the idea of embryonic or germinal creation, we refer, again, to the masterly arguments of Paul. Hear him:

"Levi, also, who receiveth tithes, paid tithes in Abraham. For he was *yet* in the loins of his father, when Melchisedec met him." (Heb. vii: 9, 10.) Now, Abraham was the father of Isaac; and Isaac was the father of Jacob; and Jacob was the father of Levi. Abraham was, therefore, the great-grandfather of Levi. Melchisedec received tithes of Abraham when he (Abraham) was 85 years old—15 years before the birth of Isaac, the grandfather of Levi! Fifty-five years after tithe-paying, Isaac married Rebekah, and, 20 years after, became the father of Jacob. Eighty-seven years after this Jacob became the father of Levi. So, counting from tithe-paying to the birth of

Isaac, we have	15 years.
From this to the birth of Jacob	60 "
From this, again, to the birth of Levi	87 "
Total from tithe-paying to Levi	162

And yet, Levi is said to have paid tithes in Abraham—162 years before he (Levi) was born! This is *true* evolution—evolution in *fact*, not in theory. For this whole transaction is explainable only upon the principle of embryonic creation. Abraham was, therefore, the *active* participant in tithe-paying, whilst Levi was *passive*. As in tithe-paying, so in the sin of Adam. Adam was the *active* participant in sin, whilst all the members of the race being with him, in embryo, were *passive* participants. Otherwise, there is no meaning in Paul's language to the Romans: "Death has passed upon *all* men; for *all* have sinned." (Rom. v:12). "Have sinned"—past tense—not *do* sin, in the present tense. All have sinned, *passively*. Consequently, death has passed upon all.

This exegesis makes plain the following: "Death reigned from Adam to Moses, even over them that had not sinned after the similitude of Adam's transgression." (Rom. v:14). That is, death reigned over all, even over infants. All persons, when they arrive at the time of demarcation between innocence and guilt, sin after the similitude of Adam's transgression. That is, they become *active* transgressors. Infants do not; yet they die—die by virtue of their *passive* transgression in Adam. *All*, both infants and adults die, as we have before shown, by virtue of the same passive sinning in Adam. Hence, in the fall and redemption, the following dualism obtained, viz.:

I.—The sin of the first man Adam was laid upon *all* men.

II.—The *passive* sin of all men in Adam was laid upon *one* man—the Second Adam, Jesus, the Christ.

It is said to be a "Poor rule that will not work both ways." We see that this rule works thus charmingly, and in it we see something of the depths of the "riches and goodness of God."

Our object in tracing the embryonic or germinal origin of the human race was to show *why* and *how* the Adamic sin affected each individual member of the race; and, that the death of Christ met it and effected an unconditional deliverance therefrom. In this, and the conditional redemption of *all* men from their own individual sins, we have a grand exhibition of the wisdom, love, and power of God.

The *fall* of man was caused by a trialism of causes. There was

I.—The Tempter.

II.—The Temptation.

III.—The Sin.

Sin gave rise to the following trialism, viz.:

I.—Man's expulsion from the garden.

II.—His separation from the union and communion of God.

III.—His separation from the tree of life.

When Jesus came the following trialism was presented, to wit:

I.—His separation from the Garden of Gethsemane. (Matth. xxvi: 57).

II.—His separation from friends. (Matth. xxvi: 56).

III.—His separation from the union and communion of God. (Matth. xxvii: 46).

The first Adam was separated from the union and communion of God by virtue of his own sin. The second Adam was thus separated by virtue of the sins of the world.

The *first* Adam was the progenitor of a physical race. The *second* Adam was the progenitor of a spiritual race. By the first Adam "*all* die." By the second Adam *all* are "made alive." But every man in his own order. Christ, the first-fruits: afterward, they that are Christ s at His coming." (II. Cor. xv: 22, 23).

Centralia, Ill.

THE THEISTIC IDEAS OF THE EGYPTIANS AND ISRAELITES CONTRASTED.

BY REV. J. J. SMITH, D.D.

We propose in the present article to call attention to the theistic or foundation truth of the theology of those two nations at the time of the close of their geographical unity, together with the reason for such a remarkable divergence of views upon a question of such manifest vitality.

The Egyptians, with nearly all nations of that period, believed in a plurality of gods. They held that from Osiris (the sun) were born the seven great planetary gods; and then, the twelve humbler gods of the signs of the zodiac; that they in their turn produced the twenty-eight gods presiding over the stations of the moon, and the seventy-two divine companions of the sun, etc. Here, it will be seen, that although the priest taught the mysterious doctrine of one supreme god greater than other divinities, yet it was not that of a distinct personal being, but a mere abstraction that becomes exceedingly mystified by their polytheistic conceptions and teachings, which served to confuse and bewilder the people, and also to involve themselves in endless perplexities. From this polytheistic fountain of false conceptions a hydra-headed theological monster came forth to pollute the land a thousand-fold more than did the plague of frogs. As a result, the lowest and most debasing form of materialism became established. All the channels of religious thought in this way became polluted and demoralizing in their influences. The practical working of their idolatrous system was truly abominable.

The Egyptians held that their numerous divinities, which were emanations from the first, had by a sort of transfusion taken up their abode in the bodies of animals among them, that they might watch the course of earthly things without taking any part in them. Hence, the most groveling homage was reverently paid to such animals as were designated by their priests as thus possessed. The sparrow-hawk and the filthy ibis, feeding on toads and snakes, were declared sacred and were honored as gods. The cat, the ape, and the jackal, were bowed to by the people. The hippopotamus, the crocodile, and even the serpent, were worshiped as divine. To show disrespect to one of these animals was regarded by them as a serious crime; to kill one was an offence so damnable as to be punished with death.

The worship of these sacred animals was attended in some instances with great pomp and ostentation. This was especially the case in the religious rites and ceremonies connected with the worship of the sacred oxen of Heliopolis and Memphis. They were kept and fed in costly temples; had a numerous and splendid priesthood; were decorated with costly trappings, glittering with jewels; were honored with gay festivals and sacred days; at their death were mourned with loud lamentations; and then were carefully embalmed and honored with processions and public funerals. Such was the absurd religious system of the ancient Egyptians; a system founded in ignorance and superstition, and which at once debased and brutalized the people.

Now, let us turn and glance at the theism of the Israelites, as contained in the writings of Moses. A people who, instead of being at the top of society, were at the bottom; were, in fact, slaves. Yet they believed in one only true God with a distinct personality, and that besides Him there is no one else. A Being uncreated, underived, eternal and unchangeable. An absolute sovereign, uncontrolledby fate or necessity; possessed of boundless power, wisdom, and glory; and that He created the earth, sun, moon, stars, and all things. That He is also a Being of matchless goodness and love; and that He presides over all the works of His hands with a watchful providence, etc.

Now, could any greater theological contrast be conceived or imagined than that which is found in these two systems. The gods of the Egyptians were in their conceptions mere visionary abstractions; low in their aims; vulgar in their habits; some of them allied to the vilest of reptiles; and all of them without moral purity. And their worship, as a matter of course, was debasing and polluting in all its tendencies. On the other hand, we have a theological system of mysterious grandeur, illuminated by the light of heaven, that will never be eclipsed or equaled. No loftier or purer Being can ever challenge our homage than the God of the Bible. And from this sublime foundation truth follow doctrines, precepts, warnings, promises, and revelations, that are at once rational, purifying, elevating and comforting; and which have from the days of Moses to the present inspired the noblest moral heroism that has ever been witnessed on earth.

The important question for our consideration in this connection is, from whence did Moses obtain this grand and glorious monotheistic idea of the Creator and Governor of the universe? Surely not from the Egyptians among whom he lived, for they were steeped in polytheism. If it be said that he had received it from Abraham, the question is only moved a step farther back; where did Abraham obtain it? Certainly not from the inhabitants of Mesopotamia, for they were idolaters. Even Terah himself, Abraham's father, had twelve idols for the twelve months of the year. Nor did Abraham, Isaac, or Jacob learn it of the Canaanites among whom they dwelt for some time, for that people had no such ideas themselves. Nor could they have received it from other nations in that remote age of universal ignorance, superstition, and idolatry. Nor can it be rationally supposed that Moses, or any one else, especially of that early period, could have risen so high above all other men, as to have originated and

written a book, not only infinitely above everything of the kind of that day, but a book that is still peerless and unapproachable by the grandest productions of the brightest intellects of the nineteenth century. We ask again, from whence did Moses obtain these illustrious truths? We answer, *through a revelation from heaven.* Upon no other hypothesis can we find a solution to this question than that Moses and other "holy men of old spake as they were moved by the Holy Ghost." The grandeur and sublimity of the sacred canon stamp it emphatically with the seal and signature of a divine revelation from God.

HEAT, LIGHT AND ACTINISM.

BY REV. PROF. S. WOOD

[*Concluded.*]

It is well known that the rays from the sun, when they enter a denser medium, in a direction perpendicular to the surface, are not bent, but proceed in the same direction; but upon entering such medium obliquely, they are bent towards the perpendicular, and the greater the obliquity the greater the deflection; the heat being the least deflected and the actinic rays the most deflected—not but that heat and actinism are present in all parts of the spectrum. As this is law, it is universal, and must have, like all physical things, a spiritual origin. A corresponding law, then, must exist in the spiritual world, and be universal; and this law must be a manifestation of some quality in the Creator, from the effluence of which it was formed. The will of God is predicated of the divine love. The thoughts, or word of God, is predicated of the divine wisdom, and the power of God, of the divine Spirit.

The influx of this trinity into the spiritual world, or into the human mind, enters a denser medium. It is received in a perpendicular direction only, in such minds as are not turned, in the least degree, from God. If there are such minds, this influx will not be deflected, and would not be recognized as three things. Such recipients would recognize and reciprocate it as the divine love, from which all their wisdom and power is derived. But when this influx enters minds that are in some degree turned from God, the rays are bent towards the perpendicular, and the greater the divergence, the greater the deflection, and the more separate appear the three principles of love, wisdom and power. But the divine love is the least deflected and the divine power is the most deflected toward the perpendicular. Let us refer again to the edict of a monarch: the edict is the manifestation of his will, and the spirit of it, in its execution, is a manifestation of his power. His will is supposed to be the motion of his great love for his people; then the will would be predicated of his love; the edict of his wisdom, and its execution would be predicated of his power.

Suppose this edict to be received by a truly loving, loyal people; it would enter their minds directly; but in entering the minds of those who were lacking in loyalty, the influx would be oblique and the rays bent; but the love of the monarch would suffer the least deflection in entering this denser medium. The edict, which is its manifestation, would of necessity suffer a greater deflection; but the execution of the edict would be the most bent; and the greater the lack of loyalty, the greater the deflection. Any one of ordinary intelligence may see this, but be unable to perceive what relation it has to "the cause of material things," or to the nature of heat and light under consideration. The connection is by correspondence: if heat, light, and actinism are to the physical world what love, wisdom and power are to the mental world, then *they* are not only in correspondence, but they must correspond in every particular. This ethereal fire of the sun, which comes to us as heat, light, and actinism, is natural substance, but it is a degree higher than the most refined, earthy substance of which the eye is formed; and it enters the eye by influx, and not like a "rifle bullet." J. S. Mill says: "There is *probably* no hypothesis in the history of science, in which both the agent itself, and the law of its operation were fictitious." Let us see! The undulatory theory, now so popular, must inevitably and utterly break down under the remediless weight of fictitious assumptions. The ether itself, as introduced in that theory, is a pure fiction; its solidity is not only a fictitious assumption, but bangs nonsense. The assumption of its oscillations is another fiction: the agent is not only fictitious, but the law of its action. Stallo says: "This hypothesis identifies light with other forms of radiance, and even with sound, by showing that all these phenomena have the element of vibration, or undulation (which is well known to experience), in common, on the assumption of an all-pervading material medium, of a kind wholly unknown to experience, as the bearer of the luminar undulations. In this case, as in all similar cases, the identity lies, not in the fictitious element, the ether, but in the *real* element, the undulation. It consists not in the *agent*, but in *the laws of its action.* And it is obvious that every hypothesis which establishes coincidences between phenomena in particulars that are purely fictitious is wholly vain, because it is in no sense an identification of phenomena. It is worse than vain; it is meaningless—a mere collection of words or symbols without comprehensive import. * * * * But, while the probability of the truth of an hypothesis is in direct ratio to the number of phenomena thus brought into relation, it is in the inverse ratio of the number of such fictions; or, more accurately, its improbability increases geometrically while the series of independent fictions expands arithmetically. This finds illustration again in the undulatory theory of light. The multitude of fictitious assumptions embodied in this hypothesis, in conjunction with the failure of the consiliences by which it appeared at first to be distinguished, can hardly be looked upon otherwise than a standing impeachment of its validity in its present form." "*Modern Physics*," pages 111, 113.

What the author means by "the failure of the consiliences," etc., is the fact that science has found no other use for this "quasi-solid" called ether. It was supposed when Huygens first invented it to account for the retardation of the comets; but as it has entirely failed in this there is no *concurring act* to establish it! Stallo continues: "However ready we may be to accede to the demands of the theorist, when he asks us to grant that all space is pervaded, and all sensible matter is penetrated, by an adamantine solid exerting at each point in space an elastic force 1,148,000,000,000 times that of air at the earth's surface, and a pressure upon the square inch of 17,000,000,000,000 pounds—a *solid*, which, at the same time, wholly eludes our senses, is utterly impalpable, and offers no appreciable resistance to the motions of ordinary bodies—we are appalled when we are told that the alleged existence of this adamantine medium, the ether, does not after all

explain the observed irregularities in the periods of comets; that, furthermore, not only is the supposed luminiferous ether unavailable as a medium for the origination and propagation of dialectric phenomena, so that for these a distinct, all-pervading electriferous ether must be assumed. * * * * There is an impulsive whirl in our thoughts when we are called upon in the interest of the received form of the undulatory theory, not only to reject all the presumptions arising from our common observation and all the analogies of experience, but to cumulate hypotheses and ethers indefinitely" (p. 114.) The author here refers to the facts that there had not only been an electriferous ether fictitiously presumed, filling the same space with the luminiferous ether, but that this luminiferous ether had been supposed to be of different "rigidity" with the direction of the strain; and finally, that "this ether consists of two media, each possessed of equal and enormous self-repulsion or elasticity, and both existing in equal quantities throughout space, whose vibrations take place in perpendicular planes, the two media being mutually indifferent, neither attracting nor repelling.

The very idea of waves was suggested to account for the "spaces"; the ether was invented to admit of waves, or vibrations, and its solidity was demanded by its office. But as some of the phenomena seemed to require the vibrations to be perpendicular to the line of direction, while others called for a coincidence with it, a necessity arose for another medium, occupying the same space, whose vibrations should be at right angles with the other; the electriferous ether constituting the third all-pervading medium, and *each of these* SOLID! All this vast machinery becomes unnecessary by considering that the spaces are imparted to the radiating corpuscles by vibrations at their birth, and their reaction upon each other preserves the distances.

IS MAN'S PHYSICAL NATURE AN EVOLUTION FROM THE LOWER ANIMALS?—No. 2.

BY REV. JOS. S. VAN DYKE.

In order to account for the phenomena, the theory in question is under the necessity of attributing an almost prescient intelligence to the ape family; for how else shall we explain the development of human organs during their incipient stages? And even the highest intelligence conceivable seems inadequate to account for changes which during their progress, and until the transformation was nearly or quite complete, must have been positively detrimental. During the entire period that the fore-feet of the gorilla were developing into hands, he must have been less perfectly fitted to his previous mode of life, and as yet but ill adapted to even the lowest savage-life. In like manner, it is nearly impossible to conceive that he should have possessed intelligence sufficient to perceive the advantages ultimately to arise from assuming a more erect position: and unless he foresaw these advantages, and in fact deliberately decided on present self-denial, for the sake of advantages to his posterity, we are forced to adopt some other explanation quite as unreasonable, blind chance or an innate power unconsciously evincing superior intelligence. Mr. Darwin, perhaps from long experience, seems able to conjure up a personal principle under the term "Nature," which is assumed to possess the power of controlling the affairs of the animal and vegetable kingdoms. This all-potent intelligence refuses, however, to come at the bidding of non-believers in evolution.

Through what agency does unconscious nature operate in producing results which so powerfully remind us of a controlling intelligence? Has she chosen the "Survival of the Fittest?"—and is this an instrumentality so well adapted to the improvement of species as to leave upon our minds the settled conviction that Nature, though supposed to be blind, can exhibit marvellous intelligence? Does the mere survival of the fittest ensure improvement? We think not. The expression has been very adroitly chosen, for there naturally slips into it the assumption that the fittest to survive are an advance on their predecessors, whereas they may be the same, or may be more degenerate. That the fittest to survive are an improvement on their ancestors—the very thing to be proved—is what has not been proved. In the severe struggle for existence, "more individuals being born than can possibly survive," can the fittest do anything more than hold their own? Is it fair to assume that because the weakest perish, therefore the others are an improved type? A more legitimate inference would be that those which survive are degenerate. If the conditions of life are so exceedingly severe that the vast majority of the individuals succumb, are they not so severe as to weaken those which survive? The Texan cattle-raiser, on hearing in the spring that the severity of the winter has caused the death of nine-tenths of his herd, does not conclude that the remaining one-tenth has been greatly improved by the causes which destroyed the rest. If carefully housed and fed the ensuing year, they might possibly perpetuate a variety slightly more hardy—though this is somewhat doubtful, and if it did occur it certainly could not be legitimately said that the "Survival of the Fittest" was the efficient cause; but if the remnant were left to the terribly severe struggle for existence which is going on in Nature, it is evident that their survival, far from carrying with it an implication of improvement, would merely justify us in concluding that the more weakened and the more degenerate, or the younger and the older perished—the less weakened and the less degenerate survived. The causes which produce the survival of the fittest evidently tend to produce general degeneration; they manifestly have no efficiency in causing improvement. It has not even been proved that the very best individuals which any species can produce are capable of self-improvement if left to the hard conditions of life to which they are exposed when not under domestication. They frequently degenerate. Has there ever been a sufficiently extensive generalization to justify the assertion that the tendency to improve, under such circumstances, is more potent and more universal than the tendency to deteriorate? Certainly it has not been proved that the less degenerate go on improving till a new species originates.

The preponderance of probability is evidently in favor of the assumption that the fittest to survive are themselves a degenerate class. Conditions of existence which destroy the vast majority of the individuals of a species must certainly tend to weaken the survivors. If natural selection, under such circumstances, enables them to hold their own, it evidently does well. When summer droughts are so severe as to destroy three-fourths of all living vegetable organisms, the remaining one-fourth is not likely to be above the normal

standard. Hence, that improvement is an attendant on the struggle for existence is a purely gratuitous assumption. There is natural selection, unquestionably; but it occurs under circumstances unfavorable to the production of improved varieties. The hard conditions do not terminate the moment natural selection has resulted.

"The stronger and the more vigorous survive." Yes; but the stronger and the more vigorous compared with what?—with the individuals which perish manifestly; but it is assumed that they are the stronger and the more vigorous compared with the normal condition of the species. This, however, has not been proved; and until it is proved, the inference that there will be an improvement in the species is an unwarrantable assumption; indeed, it is tantamount to saying that the harder the conditions of life the greater the improvement.

GOD AND LAW.

BY J. R. HOFFER.

Under the heading "Relationship of God and the Laws of Nature," in the October MICROCOSM, Rev. William Allen treats natural mediums as laws when he says, "Miracles are opposing, conflicting actions, in which there is no discernment of general law." Are they not the production of natural results by uncommon means, not necessarily unnatural ones? The Lord turns water into wine continually, using the grape as a means; but He did it once without the grape. And was not Lazarus returned to his material body by the same law that put him there at birth, although the natural medium was not the same? The laws which produce wine and impart life are not limited to means; much less are mediums such laws. Mr. Allen gives a partially correct definition of physical laws in saying, "They are, after all, only an omnipresent God giving energy to the things He has made."

In order properly to understand this subject, a clear conception of the relation of God to His works is necessary. "He has not made the physical universe, given it laws of government, and then gone off." Nor has He produced it as a mother brings forth her child and afterwards tries to manage it, as is implied in asserting that after creating light, "in order to utilize it, He commenced a course of action on it." If we can grasp all that is implied in what Mr. Allen elsewhere says, that 'the instant God should withdraw Himself from the solar system, not only the laws of light, but light itself would cease to be," we will see that God did not *institute* laws, but that His laws are indeed "the unseen hand of God." Thus creation and maintenance are the same thing, since the instant the maintaining power is withdrawn, the thing created ceases.

All Nature is simply effect. Not an effect produced upon something independent of God, or set apart by Him, but the product of His constantly out-stretched arm; for if all that He is were withdrawn, nothing would be left. To destroy everything might therefore imply His own destruction. He is life and love, the way or means and the truth. Life is action; and it cannot act where there is nothing on which to operate, except by producing and maintaining something. Love cannot exist where there is nothing to be loved. But if God must maintain something outside of His own Being, in order himself to exist, surely that which He maintains cannot be self-existent. He is its only law.

But how is God omnipresent in the things that are outside of Him? He is declared to be a "consuming fire." He cannot be personally present, any more than the sun can be present upon the earth. But as the sun's light and heat are present, and maintain all nature in existence, so the God with us (all we can endure of his presence) maintains all things.

MOUNT JOY, Pa.

ELECTRICITY THE MOTOR POWER OF THE SOLAR SYSTEM.—NO. VII.

BY B. T. KAVANAUGH, M.D., D.D.

THE SUN THE CENTRAL SOURCE OF MOTION.

The Sun when personified is invariably spoken of in the masculine gender, while the earth and its satellites are invariably spoken of in the feminine. This nomenclature is suggestive of the office borne by the sun, as the great central source of power, and his peculiar influence over the planets and other bodies of the solar system, as they possess affinities and properties which form the counterpart of the sun's nature and character.

To illustrate and demonstrate this I notice first: that the solar rays which in their direct line would pass *near* the earth, but would not strike it as they approach it, experience an attraction sufficient to draw them from a line into such a curve as to direct their course towards the planet, thereby concentrating upon its surface more solar influence than it would have had, but for the strong mutual attraction existing between the negative planet and positive sun.

It is upon this principle that the earth, in its revolution on its axis, concentrates, upon the side receding from the sun, such an aggregation of solar rays, that it acts as a vast battery, driving the earth in the direction of its progress in its orbit, as shown in a former number.

Such a concentration of the positive rays on the eastern side of the earth, would have a strong tendency to repel the whole earth to a greater distance from the sun; but this tendency is counterbalanced by the fact that the negative or western side is so strongly attracted as to prevent any retrocession from this cause, and is held upon a balance in the line of its orbit. Here both the diurnal and the annual motions of the earth are perpetuated and harmoniously preserved.

Another great result growing out of the positive and negative—male and female—characteristics of the sun and earth, respectively, is that whereas on the one hand the action of the positive electricity of the sun forbids the approach to, or departure from him, of any planet, beyond a certain line; on the other hand, the planets themselves all being negative or electro-magnetic, they mutually repel each other, and it is an electric impossibility for one of these planets to come in conflict with any sister planet.

On this principle, all planets, having satellites revolving about them, are preserved from collision. The primary planet and its satellite being both negative, and each revolving in an orbit corresponding to its magnitude, repel each other. But the question may arise, would not this repulsion drive the satellite outward from its orbit? This tendency is counteracted by the gravitating

force of the planet around which it revolves, for, it will be remembered, in a former article, we admit that the earth and every other planet is endowed with the power of gravitation, sufficiently to hold intact every material substance belonging to it, and that this gravitation may extend to its own satellites, but it cannot and does not extend to other primary planets or to the sun. Every demand involved in controlling the motions of these bodies is fully met and completely answered in the positive electricity emanating from the sun in its two-fold action of attraction and repulsion.

The male and female characteristics of positive and negative electricity, in their joint action, are more clearly seen when we consider the agency of each, in giving fruitfulness to the earth, in the production and development of vegetable and animal life

The germination of seeds when deposited in the earth's surface, and the growth of plants, are produced by the action of "heat and moisture," as it is commonly expressed; but the real source of this heat and moisture seems to have been unknown or unnoticed by writers until the electric theory presented the true source of these agencies, and to a great extent the mode of their action.

When the rays of the sun fall upon the surface of the earth, the light of each ray is converted into heat, and hence one of these elements—heat—is directly communicated from the sun to the germinating seed, and with it an electric force to quicken the germ into life.

Light, as it falls upon the earth, is not cumulative, but is converted into heat and electricity, the two latter accumulate and impregnate the earth and atmosphere with their forces. From seed time to harvest there is a great aggregation of their powers in the lower atmosphere, where the positive electricity commingles with the magnetism of the earth, and both are thrown into a comparatively neutral state. It is from this electro-magnetic atmosphere that vegetables and animals derive their vital energies. It enters through the lungs into the blood of animals, and through the leaves into the circulating fluid of plants. Here, then, life is generated and sustained by the joint agency of the sun and earth, and here the *motherhood* of the earth is clearly manifested under the genial warmth of the sun, "Which is as a bridegroom coming out of his chamber and rejoiceth as a strong man to run a race. His going forth is from the end of the Heaven, and his circuit unto the ends of it: and *there is nothing hid from the heat thereof.*"

MOISTURE being indispensable to growth and maturity, a wise and wonderful provision is made in Nature by which the electric agencies are charged with the furnishing of this essential factor. When the upper atmosphere becomes dry and thirsty, strong currents of electricity are superinduced upon the earth corresponding to like currents of an opposite character in the atmosphere above, producing an irrepressible tendency to union on the parting of the upper and lower currents, resulting in the formation over the most heated and excited parts of the earth of a "temporary low barometer." Where this occurs, there is thereby superinduced at a distant point, generally on the polar side, a "temporary high barometer." A high barometer is a down-pour of air from the upper regions; a low being an upward pour of air greatly excited by electric action. The high barometer serves as a feeder to supply the vacuum created by the action of the low. This pair—a high and low barometer—rise in the western part of the continent and move eastward, often very rapidly. In the centre of the low barometer there appears to be a vacuum, formed by a magnetic line excluding the pressure of the atmosphere. The violent upshoot through this vacuum of highly charged electric air, when passing over any large body of water, carries upward with it, in spiral form, a vast column of water to the upper regions. With this water is often drawn up a number of frogs and fish which are frequently found on the earth after a heavy rainfall.

This volume of water, which being from the earth is in a negative state, now meets with violent currents of positive electricity, by which it is charged to a high degree with positive electricity, the effect of which is to separate the mass into vapor. The gravitation of the water is overcome by the positive electricity which revolves about each atom; all being in a positive state, they mutually repel each other, and thus expand into clouds of vast dimensions, floating off and supplying the uttermost parts of the continent with rain.

Thus it will be seen that the whole process of gathering up the waters from the earth, conducting them into the aerial ocean, forming them into clouds, distributing them over the continents, and sending them down in fruitful showers, is wholly an electric process.

It is true that moderate rains are produced by the evaporation of the waters of the ocean, but it is equally true that this process is carried on by the light, heat, and electricity proceeding from the sun, and must be considered as an electric phenomenon similar in nature, but more gradual in its action than that described above.

Now, that we have accounted for both heat and moisture on purely electric principles, we propose, by way of illustration, to apply these principles in the production of a single tree. When an acorn, for example, is deposited within the surface of the earth, and a sufficient quantity of heat and moisture applied to the soil, the germ of the acorn is penetrated and vitalized by the magnetism of the earth which is of a negative character. The body of the acorn, by chemical affinities, through electric agency, supplies the first nutrition which centres in the formation of a tap root which passes downward in a tender, pulpy form. The atoms which compose the pulpy mass, all being negative, repel each other, and lateral roots pass off in opposite directions. Each fibre of the root repels its fellow, so that every projecting fibre takes distance from the others as the space may allow, and the roots are equally distributed on all sides. By these repelling forces the roots are controlled even to their utmost development. As soon as the young roots are formed, and begin to extract nutrition from the earth, they send it to the centre-point in a negative magnetic state where it acquires a great affinity for positive electricity, and hence sends up a stem which penetrates the superincumbent earth and peers above the surface. As soon as it emerges into the atmosphere, it meets a very dilute form of electro-magnetism, where it seizes upon and appropriates all the positive electricity in its reach at that low point.

As the stem, thus strengthened, rises higher from the earth, its state still being electro-magnetic, it has not the power by repulsion from within to send out branches, until it reaches such a point in its upward progress as, that positive electricity gains the predominance, when, by mutual repulsion, the fluid atoms repel each other, and under this influence lateral branches are sent out from the rising stem.

Through the whole of its subsequent growth, the top of the plant is most positive and vital. As there is such mutual attraction between opposite electric states, longer and heavier drafts are made by the positive top on the negative roots below, and thus, by magnetic attraction, the sap is freely carried upward until the tree attains its fullest development.

The branches of the tree, now charged with positive electricity repel each other, so as to occupy equally the space about them on the upper parts of the tree. Thus it is by magnetic and not capillary attraction that the fluids of the tree are carried to its top, notwithstanding it may be two or three hundred feet high.

The lower limbs of a tree are never as thrifty and fruitful as those above them, for the reason that they fail to receive as full vital influence as those occupying a more elevated position, and brought more under the effects of positive electricity.

The leaves of the tree in their thin and delicate structure, are admirably adapted to receive from the atmosphere the elements therefrom supplied, including electric and chemical qualities essential to the health and maturity of the tree.

If the views here taken be correct, it will be shown that the whole structure, form and growth of the tree are in strict conformity with the laws of electricity.

MT. STERLING, KY.

AN OUTLINE OF ARGUMENT.

BY REV. PROF. S. B. GOODENOW.

At the request of Dr. Hall, I give a brief synopsis of the articles which I have sent him during the last few months, in reply to his criticisms of Newton, and which he has not found room to print in THE MICROCOSM.

The objections made against the gravitation law are founded upon misunderstanding and neglect of all the three great laws of motion, which lie at the base of everything that astronomers teach.

1. *First Law of Motion*, concerning inertia. This law is ignored, in all that is said about gravity's causing only a small part of the sixteen feet fall in a second, while all the fall from a tangent is said to come from gravity alone.

2. *Second Law of Motion*, concerning composition of forces. This law is ignored; in all that is said against the reckoning of fall from a starting tangent, and in the claim that all acceleration is destroyed by side-projection.

The law insists that *no force is lost;* and that the whole motion, coming legitimately from an acting force *is virtually maintained* in its own proper direction, however combined in *composition* with other forces and motions, as a *resultant* of them all. This requires that the distance a body would fall by gravity alone in any given time, be virtually maintained when projection throws it into an orbit—as the same value of falling distance, in the same average direction, from the point where the body *would be* on its tangent to the point where it *is* on its orbit after that given time. And, by our diagram and demonstration of August, we proved that this is so.

It follows that as acceleration of direct fall by positive *motion* gradually *dies out* by more and more side-*projection* added, a new acceleration of more and more *divergence* from the starting tangent *accumulates;* till, at the circular orbit, all extra *gravital motion ceases*, and an *equivalent* gravital *divergence* has taken its place.

Dr. Hall insists on the first half of this principle, the *dying out of accelerated motion*, but persistently denies the second half, the accumulating of the "equivalent" *accelerated divergence*. And his main ground for denying the existence of the "equivalent" is, that the doctrine of scientists concerning the *fall of projectiles*, founded on this view of an equivalent fall from tangent, is utterly absurd and ridiculous, as he vividly portrays in the November MICROCOSM (as well as in the number for March).

But that ridicule of the doctrine of projection is all built on an entire mistake of its teaching. The law of dynamics is, that a body projected horizontally from an elevation will fall *to the level of the ground*, (that is, to a horizontal line parallel to the the starting tangent of motion) in almost exactly the same time as it would fall directly downward if dropped from the same height, the deviation from exactness being infinitesimally small and altogether imperceptible. And this assured truth is in exact agreement with the law of fall from a tangent.

But Dr. Hall curiously misunderstands the teaching of science to be, that the projectile will thus fall *to the curved surface of the ground* from a curved orbit supposed at the top of the elevation, in the same time as if let drop. Of course this funny representation of science puts it in a most ridiculous light, and furnishes the doctor a splendid chance for ridicule, which he indulges without stint. The whole laugh is squelched by the simple statement of the real doctrine of mechanics, as given above.

3. *Third Law of Motion*, concerning equal action and reaction. Dr. Hall proceeds (in the Oct. Nov. and Dec. numbers) to ignore this law also, by a new charge entitled "Newton's Great Oversight." He claims that an important element has been omitted in calculating the moon's fall from its tangent, namely, the mass of the moon as "pulling itself" by a value of "one-eightieth more" than the astronomers give it; and he says that this alleged omission entirely nullifies the gravitation law. To which we answer:

I. No omission of this sort, if it could be shown, would vitiate the law of gravity, which is proved by *actual observation* of the heavenly bodies; not only as appears in the third law of Kepler, but also in the observed month-length and moon-distance, which *prevent astronomers from miscalculating the moon's fall from its tangent, even if they would.* Our defence of Newton against the charge of omission is wrongly called by Dr. Hall "this definite admission" that the omission, if proved, would overthrow the gravity law. We admit no such thing.

II. We deny that any omission has been made. The *moon's mass* does not affect its own rate of fall from its tangent. Yet it does give *motion to the earth*, thus adding to the total gravital velocity of *mutual approach*, toward a common center of gravity, and lessening the total *time of reaching* each other at that common centre (in case of a fall); thus, also, it lessens the *size of orbit* and the total *time* of revolution in it, and so *lessens the moon's distance* from the common centre, by which its *ver-sine*, or fall from tangent, is to be reckoned.

Hence, when astronomers, with the moon's observed velocity of revolution, reckon its fall from tangent as ver-sine of an orbit at *full distance* from the earth's centre (just as if that were the centre of revolution, without mass to the moon),

they find that they have the value of gravital velocity, or fall from the tangent, *too large for the distance* of the two bodies, as required by the gravital law of squared-distance inverse. The reason is because the total distance they are using is *longer than the actual radius* of the moon's orbit, lessened as it is by revolution around a common centre, on account of the moon's mass.

Therefore, they can correct the calculation; either by taking (in their ver-sine reckoning of the moon's fall from tangent) its true orbit radius, as reduced from the total distance of moon and earth; or by reducing their ver-sine reckoning found too large (in the use of the total distance), in proportion as the true radius is shorter, namely, in proportion as the moon's mass increases the total mass and gravital effect. It is in the last-named form that astronomers usually express the *allowance made for the moon's mass*, not in *increasing* the *moon's fall* from its tangent (as Dr. Hall puts it), but in *decreasing* their own first and approximate and erroneous *reckoning* to the true, unchanged lunar value.

Thus, in Robinson's "*University Astronomer*," §172, he says: "If the moon had no mass, that is, if it were a mere material point, and were not disturbed by the attraction of the sun, [notice *two* allowances rightly *made*, instead of one, and that *omitted* according to the charge] then the distance that the moon would fall from a tangent of its orbit, in one second of time, would be [seen to be] just equal to $g\frac{r2}{R2}$," or the sixteen feet of fall at the earth's surface [the "yardstick" still unbroken!] multiplied by the *inverse squared* ratio of the surface and lunar distances from the earth's centre, as reckoned by the gravity law. He goes on to say: "The distance that the moon actually falls from a tangent of its orbit, in one second of time, is equal to the ver-sine of the arc it describes in that time, and the analytical expression for it is $\frac{\pi 2}{2t2}R$," or the radius of the moon's orbit (R) multiplied by half the squared ratio of the *circumference*, or arc travelled to the *time* of revolution or travel.

He proceeds to show that, if this radius R is taken as the *whole distance* from the earth to the moon, it gives a ver-sine of gravital value *larger* than the true value above, $g\frac{r2}{R2}$, required by the gravity law. Figuring it out (with correction for the sun's interference) he finds it *one seventy-fifth* larger; and he says *this difference is caused by the moon's mass*, increasing the total mass and fall from tangent, from 1 to $1+m$; adding, "Laplace says one seventy-fifth of the earth is the true mass of the moon." We thus see, that the first or proximate ver-sine reckoning of the moon's fall by *total distance* from the earth, has to be corrected by *reducing it one seventy-fifth* on account of the moon's mass, to the true orbit radius or distance to the common centre of gravity and of revolution. And then, we have the *corrected reckoning* exactly in agreement with the *unchanged fall* from tangent, which is ever $g\frac{r2}{R2}$, or as the squared-distance-inverse required by the gravtiy law.

This is the reckoning of the astronomers; and who now shall say, that they make no allowance for the moon's mass—or that by a "great oversight" they omit one-eightieth of the value? And who does not see, that the allowance made is no deviation from the gravitation law, but only a *correction of reckoning*, one-seventy-fifth (not one-eightieth) purposely cast out from their own first proximate and erroneous figures? This simple exhibit is enough, to silence entirely the new objection raised against Newton's law of gravitation. But some other things may be said:

1. It is the doctrine of astronomy, that *all bodies* at a like distance *commence falling* toward the earth *with equal velocity*. A feather and a pound of lead let drop (with the impeding air removed) will fall to the ground in the same time, as every schoolboy learns. And so, the moon, whether large or small, or the moon and a pebble at the moon's distance, would commence falling toward the earth (if allowed to do so), both with the same velocity precisely. And all the moons of Jupiter, though of different sizes and weights, would fall at the same rate, if let fall from the same height above the planet.

Yet, for saying these very things, which everybody receives as true, Newton and his "*Principia*" (from which they are quoted) is condemned as thus committing a "great oversight," an important *omission*, namely, omitting to take account of the differing size and weight of the falling bodies. In order to give color to the complaint, Newton is represented as teaching in these statements, that the moon and the pebble would *fall to the earth* both in *the same time;* a thing entirely different, which Newton never dreamed of, and has himself shown to be impossible, (as we see above.)

In like manner another passage from the "*Principia*" is made to say (by brackets inserted) that the *earth's force alone* makes the moon fall from its tangent and a stone fall as it does; when all the argument, and the entire work of Newton will show, that by "that force" when spoken of as doing all the work, he means that *total gravital force* of earth and falling body combined, so that, he is not omitting any one-eightieth part.

Dr. Hall seems as if entirely unaware of the *peculiar* nature assigned to gravity, as *a self-multiplying power*; by which it increases the *momental force* of a falling body with its weight, without increasing its *velocity* of fall so that the *product* and not the *sum* of two masses shows the attracting force with which they are drawn together. The Dr. all the way *adds* the moon's mass to that of the earth to show the mutual force, as if the two bodies acted like two boats drawn together by ropes; whereas, Newton *multiplies* together the two attacting masses to show their mutual force; and so keeps in with the accepted fact, that the *falling velocity of a body does not depend at all upon its mass*, and the moon's mass cannot affect its own rate of fall.

The mere announcement of this principle; so universally accepted, that an ounce and a pound of lead fall toward the earth *at the same rate* (though not with the same force,) at once and completely overturns the objections issued against Newton and the extracts made from his "*Principia.*"

2. The mass of a falling body increases its *momentum* or force of fall; but does not increase its *velocity* of motion. This also every academy student knows, that the force or *momentum* imparted to a body is the product of its *mass* multiplied by its *velocity*. So that, the increase of its force and momentum by and as the increase of its mass, leaves (and *must* leave) its *velocity* unchanged. Hence, doubling the size of a stone, or of the moon, and thereby doubling its momentum, *cannot* increase its falling speed.

Since, in *any* case of bodies mutually drawn or attracting, the *monentum products* of the smaller body *cannot* be increased nearly as fast as its *mass*

factor is increased—therefore, its other or *velocity-factor* has to *de*-crease, instead of *in*-creasing with enlargement of mass, as Dr. Hall contends.

And since, by the peculiar nature of gravity mentioned above, as taught by astronomers, *the whole* force or momentum to *its own mass* without the other mass added in—therefore, any extra force or momentum due to extra mass is proportioned to that mass; and, the falling body's *mass-factor* thus changing in the same proportion as its *momentum-product*, its other or *velocity-factor* has to remain unchanged. This is as certain and as simple to a child, as that 3 times 4 are 12—and if both the 4 and the 12 are doubled, the 3 must remain unchanged—so that 3 times 8 are 24.

Thus the multiplication table completely overturns the objection against Newton, and shows that he has omitted nothing from the moon's fall from its tangent, because there is *nothing to omit* from that fall. The value complained of as lost, has gone into the moon's *momentum* or force of fall, and does not belong in its *velocity* or rate of fall, as Dr. Hall wrongly imagines. Astronomers have no occasion to *talk* about the moon's mass, when they are calculating its *rate of fall*, because in their view that has nothing to do with the subject; nevertheless they do give the moon full credit for its mass or "pull of itself," when they treat of the moon's weight and momentum or *force of fall*.

3. The pull of two attracting bodies, like that of the two boats supposed by Dr. Hall, is not only *mutual*, but *equally exerted* on both bodies, making the proportional *motions* of the two to be *the same as if* each body were *moved alone and entirely by the mass and force of the other body*. Hence, to say that the moon's gravital tendency to the earth is to the earth's gravital tendency to the moon, and that the moon's distance is to the earth's distance from the common center of gravity, as eighty to one, the same proportion *inverse* as the masses of the two, (more currectly seventy-five to one, as astronomers make it)—is to *include the whole* motion of each, its *re-action* as well as its action, its "pull of itself" as well as the pull of the other body.

Newton and the astronomers do thus reckon, by the *total* motions of each body as thus *proportioned each to the other's mass*; and therefore they *cannot be omitting anything*, even if they do not stop (in this connection) to analyze the values into parts, showing what part is action and what re-action or "self-pull" of the body.

They certainly do make the correction of one seventy-fifth, as we showed at the start. Now if they are right in treating gravity as peculiar, and velocity of fall as equal for all masses, then that correction is merely (as there said) a *reduction* of their ver-sine reckoning, to bring it to the true fall from tangent required by the gravitation law. But, if they should even be found wrong as to the equal velocity of all falling bodies, their correction will still remain *actually made*, as an *enlargement* of the moon's fall given by the gravitation law (on account of the moon's mass added in) so as to bring up the value to the full gravital tendency or approach of both bodies towards each other—the very addition of *one seventy-fifth more* which Dr. Hall so earnestly calls for.

In either case, the charge of "oversight" and "omission" made against Newton is entirely annihilated; and any seeming lack of *stress* and reiteration on his part concerning the subject of "self-pull," is easily explained. Since, in his view, by the peculi r nature of gravity, *just half* the moon's gravital motion is due to action, and *half* (not "one-eightieth") is due to reaction or "pull of itself" in every case, (and the same in regard to the earth)—as the introductory lessons of the astronomers show—they may not be impressed with the need of stopping in the midst of their later treatment to remind the Doctor of this fact—not expecting him so soon to forget.

Yet he need not on that account fall into the error of calling the "moon's pull of itself" *one-eightieth* part, instead of *one-half* of its motion (as astronomers make it)—nor into his other error of saying, that a moon half as large as the earth (or *forty times as massive* as at present), with only "one-half more force," would be moved to fall "one-half *faster*!" Nor need he fall to charging the scientists with *not knowing* the laws of reaction and omitting its value, merely because they are not *all the time* and everywhere talking about it. Our friend *says more* about the moon's "pulling itself" than do astronomers; but possibly he may *know less*.

Under this idea of "self-pull" he seems to have got a glimpse of the great matter of Re-action. But does he not ignore all the great laws of *equal action and re-action*, when he overlooks the equal division of force to the two bodies, by teaching that to give the *total* motions as eighty to one is to *omit* the whole re-actionary parts; and especially, when he fails to see that re-action of gravity particularly gives *half the motion*, not the meager "one eightieth" that he allowed? Is not "information needed" here?

Of course, in the above *mere outline* of several articles we have written for Dr. Hall we are able to give only a hint of the full arguments, by which we have answered his animadversions upon Newton. Wherever the reader fails to see clearly the points made above, he should attribute it to the constrained brevity of this synopsis, which covers the whole answers to several very long essays of the Editor's in successive numbers; and he can console himself with thinking, that if there had been room in THE MICROCOSM to print in full some of the points made above, as they are still lying in the office, the subject might be plainer all round.

The same reason, of enforced brevity, with other reasons, has compelled me here to omit any reference to many personal allusions somewhat disparaging, and many incidental statements scientifically inaccurate, whose exposure would show still further the need of information—to be more widely disseminated on this great subject. It is for such aid to truth, that I am taking the pains I do in writing so fully as I have.

BATTLE CREEK, Iowa, Jan. 1st, 1883.

THE TRUE PHILOSOPHER.

BY PROF. H. S. SCHELL, A. M.

The Creator has given to man two revelations of Himself. The first is the natural universe. The second is found in the Bible. Had man been able to learn his origin and destiny, and his relations to God from the first, the second would not have been given.

The true philsopher searches for truth in both; but the materialistic philosopher ignores the second. If, however, it could be proven that the Bible was simply an invention, it would show that man in the infancy of the race was wiser, more intelligent,

and possessed more literary genius than he does at present.

It is a fact worthy of note that the very first verse of the Bible contradicts many of the materialistic and infidel theories of the present day, as well as those which existed thousands of years ago. That verse reads: "In the beginning God created the heavens and the earth."

This contradicts the theory that the heavens and the earth were self-existent and eternal—they had a *beginning*.

It contradicts atheism, as it declares that *God* created them

It contradicts pantheism, as it shows that God is *distinct* from His works.

It contradicts poly-theism, as it declares that *one* God was the Creator, and

It contradicts fatalism, as it declares that the power of God *caused* creation.

Hence it appears that the Creator, foreseeing the various false theories that would arise, began His second revelation by declaring their falsity.

Let us observe what God says of the origin of man and contrast it with the materialistic philosophy of the present day.

"And the Lord God formed man of the dust of the ground and breathed into his nostrils the breath of life, and man became a living soul. . . . So God created man in His own image. . . . Male and female, created He them." Now compare this with the teachings of our most noted and learned materialistic philosophers, who assert that hundreds of millions of years ago no life existed in the universe, and that during these ages, when force was operating on matter to evolve the worlds, a few particles of albumen on this earth spontaneously came into existence and generated life, and an insect, or cytod, which they named the moneron, came forth out of inorganic matter. That this insect multiplied by a division of itself, and in process of time its descendents numbered many millions, and some of them evolved into higher organisms, and the descendents of these into still higher organic types. That this multiplication continued age after age, until their descendents evolved into protozoans; then into worms; then followed ascidians, fishes, reptiles, amphibious animals, birds, opossums, kangaroos, jackals, foxes, wolves, dogs, lemurs, and monkeys; until, finally, the highest type of ape appeared, and he, in time, evolved into the lowest type of man. All this was effected by divergeance, differentiation, natural selection, survival of the fittest, etc.

This highly scientific (?) theory requires us to believe—as shown by numerous quotations in the "Problem of Human Life"—that all the physical members, organs, and functions of the human body, the soul or life-force, with all its instincts, senses, and mental faculties, and the spirit with its intellect and immortal attributes were concentrated in the body of that one particular moneron which happened to differentiate in a particular way, and from which man descended; and that through all the millions upon millions of years that were required to effect the vast number of changes from this insect up to man, not a single fatal accident of any kind happened to one of its lineal descendants; for had such accident happened, the chain of descent would have been broken, and no man, not even a materialistic philosopher, would have been in existence on the earth to-day!

What an escape, or rather, what an infinite number of escapes we have had!

It is a favorite maxim of philosophers of this school "that where faith begins science ends." One would suppose that if all the faith that has ever existed on the earth since its foundations were laid, up to the present time, was concentrated in the mind of a single individual it would not be sufficient to convince him of the truth of this evolution theory; but its votaries, amongst the "advanced thinkers," as they call themselves, and materialistic scientists, are numbered by thousands. The true scientist and Christian philosopher, by accepting both of God's revelations to man, escapes such absurdities, and obtains rational views of the creation in all its phases.

EXTRACT FROM A THANKSGIVING SERMON.

The following is copied from an eloquent sermon preached on November 30th, before the united congregations of Washington Street, Cannon Street, and Hedding M. E. Churches of Poughkeepsie, N. Y., by Rev. F. Hamlin, Pastor of the Hedding Church. We make this extract, not from a feeling of vanity on account of the kindly and beautifully worded references to our work by the reverend speaker, but as a duty we owe our readers, that they may know how the work is progressing which they so liberally encourage by their subscriptions, even among people and by ministers whom we have never seen. The speaker's theme was: "A HIGHLY FAVORED NATION," and in its discussion he traced God's hand in connection with material, political, and ecclesiastical blessings. Under the latter division he first showed that neither philosophy, law nor letters could purify, and thus perpetuate national life: that philosophy becomes more profound by contact with Theistic and Christian influences, and that culture derives its sweetest fragrance from the Church's Bible; and then he called attention to the fact that

The various types of skepticism which a few years ago were openly defiant and daring, are to-day more cautious and careful. He said, "This is especially true of the sophisms of Hume and Berkley, the idealism of Kant and Fichte, the sensationalism of Hobbs, and (last but no tleast) the materialism of Haeckel and Huxley. *This enforced reticence of infidelity is partially attributable to the glaring inconsistency of skeptics, in ignoring the teachings of Scripture; that inconsistency being brought to the attention and condemnation of the people by leading Christian Theists.* When it is shown that China is going backward, and the descendents of scientific Medes, Persians and Greeks are now wretched nomads, because of imperfect reception and development of Bible truth; that Africa, once rich, populous and cultured, is blasted and ruined by trampling Bible teachings under foot; that for the same reason the wild Arabs know nothing of their ancestors who gave us algebra and numerals; when it appears that the grandest inventions and discoveries, scientific and otherwise, of the present age have been made by men who, but for mental discipline received in or through influence of colleges, all of which, as Doctor Crosby says, "were founded by Bible men," would perhaps have been hod-carriers instead of thinkers;—when these things are brought to public notice, I say, and it appears that the wild Boar of free thought first whets its tusks upon the Gospel oak, and then in turn attempts to gore to the heart the very means of its acuteness and power, the inconsistency of such a course breeds disgust on the part of reasonable men, and caution and chagrin on the part of infidelity. Another reason

why skepticism is less pretentious and more cautious than formerly, is this:

The all-sufficient and annihilating replies recently made to her by a god-fearing, intelligent man.

The answers of the Church to the claims of skepticism in the past fifteen years have been at best but partially satisfactory. True, Lyell's skeptical geology has been met by the arguments of Dawson and Dana, and speculative science in Darwin, and rationalistic philosophy and materialism in Spencer and Huxley were partially refuted by Bowne and McCosh and Christleib; and Janet's keen blade has done good service in the cause of truth; *but we cannot disguise or hide the fact that for years the purest and wisest lovers of the Church have been perplexed by the materialistic doctrines of spontaneous generation and evolution,* as presented by Darwin, Huxley and Haeckel. Under pressure (because unable to sustain the opposite view), such men as Joseph Cook, Doctor McCosh, and other eminent men of letters in the Church precipitately espoused the cause of "theistic evolution;" as if their inability to solve the problem, proved the chaos impenetrable by man. Once committed to the theory, they found themselves hampered by this question: "If God by evolution made the monkey, why did He not thus make the man?" Here they inconsistently bid adieu to the development theory, and held man as an exception to the rule in the very face of Scripture teaching to the contrary; for the Bible presents man and lower animals as *identical* in the manner of physical origin, the same Hebrew word, vayyebrau, וַיִּבְרְאוּ indicating the origin alike of great whales (Gen., 1: 21) and man (vs. 27); both were *created!* Thus driven to the wall, they hesitate in deciding whether to ignore the plain teachings of Scripture, to abandon the false theory they have espoused, or temporarily to put off the evil day by raising the McCoshian cry of "ignorance" and "reckless speculation," forgetful that truth "will not down" at such bidding.

But the needed relief has come at last, and that too from a source unexpected—from a self-made man, a consistent Christian, and an earnest advocate of the Church of God.

He who, when Israel most needed him, wrenched the crook from the hand of Moses, and placed therein a sceptre, brought from the tow-path and the academy, a student whose very name has already carried dismay and terror to the heart of infidelity; and either he or his successor, some heaven-appointed Joshua, will e'er long stand by the angry heaven-heaved waters, and with the victorious church shout, as Darwinism and materialism go down: "Sing unto the Lord, for He hath triumphed gloriously; the horse and his rider hath He thrown into the sea." I refer to that prince of thinkers, A. Wilford Hall. In his matchless volume (*The Problem of Human Life*), he at once annihilates the theory of evolution and the teachings of materialism, and on the ruins of these builds a perfect argument for the soul's entity and immortality. His line of thought in brief is this: "He shows, by reason and philosophy, the utter improbability of spontaneous generation as the start of evolution, and exposes its numerous self-contradictions. He then fully refutes the strongest arguments presented in favor even of Theistic Evolution; and shows conclusively that reversions can only be accounted for on the theory of an invisible, incorporeal, substantial organism. In this connection he lays down the simple philosophical law that "*the agent or force which moves or molds a physical or inanimate body of any kind must of necessity be a substance.* That, therefore, sound, light, heat, magnetism, etc., are substances; that within every organic existence, whether vegetable or animal, is an independent substance, which shapes and moves it (a position, we think, abundantly proven from the philology of Scripture). He holds that, as the body moves, within it there must be a substance not itself which causes motion; and as, according to science, substance is indestructible, that thinking, feeling, conscious substance which we call Soul must be Immortal. So profound is the impression made upon thinkers by this marvelous volume, that in about two years more than 39,000 copies have been sold; while his magazine, THE MICROCOSM devoted to a discussion of kindred themes, has attained a circulation of 24,000 in a single year, 6,000 of which are taken by Christian ministers of the various denominations. *It is a striking and glorious fact, for which the Church should be profoundly thankful to-day, i.e., that the six leading skeptical scientists of this age, Darwin, Tyndall, Huxley, Helmholtz, Haeckel and Mayer, though repeatedly and openly challenged to answer his arguments against their respective theories, stand speechless in the presence of his unanswerable logic.* And when leaders quail and keep silence, no wonder that followers are cautious. Thus, if the Church has not, in two years past, spread her branches over so great a surface as we had hoped, she has not been standing still, any more than has the oak when it provides against future winds and storms by driving its roots deeper and firmer into the soil. Bancroft's words were never more truthful than now. He says, "Skepticism cannot uproot Christianity, because it lives so deeply in the hearts of the millions." Wilford Hall has wonderfully deepened its life. All hail the man who throttles error, and compels the calling off of the red hounds which for years have been feeling after the arteries in the neck of Truth. God give him long life and ever-increasing usefulness here, and bye-and-bye a seat in heaven."

SIGNS OF THE TIMES.

We are receiving numerous evidences that the great professors of our colleges and universities are not allowed to rest in oblivious indifference to the important matters disclosed in the "*Problem of Human Life.*" We have now before us copies of several letters, written by eminent clergymen to the leading professors of different colleges, calling upon them for candid reviews of the book in question. So far as we know, these calls have not yet been responded to. We copy below a sample of many such appeals from the pen of the Rev. Dr. Clark, of Ludlow, Vt., which will convey to our readers an idea of what is going on:

LUDLOW, VT., Dec. 27th, 1882.

To G——M——, *Professor of Natural Sciences:*

DEAR SIR:—When I wrote you before, I had not the least idea that you would write me in reply. My wish is that some one, capable of the task, will write a candid but truthful review of Mr. Hall's "Problem of Human Life," and publish it in some Quarterly. It will do little good to charge him with ignorance, since he has manifested in his writings a *very good stock* of knowledge; nor with the vagaries of deluded fanatics, since he apparently gives the best reasons for, and the most logical arguments in favor of, his theories. And,

besides, he meets a want deeply felt in ministers, uninitiated, indeed, in the *science* (?) of the day, but most loyal to their Divine Lord. They thank God, and take courage that He has raised up one man whose head is clear enough to perceive the baselessness of the Materialistic theories of scientific men, and with logic enough to make manifest the falsity of their reasonings. I write as it *seems to me*. It may be that I am incapable of judging; but having read the book twice with a good deal of care, I must say that I have discovered few things in his main theories objectionable—certainly not opposed to Christianity—and very few instances of illogical arguments, while all along my *heart* bounds out with thanksgiving to God for such a book. I had read other works treating of this great problem, but they met not the wants of my soul.

Will you wonder if we, the common people, hear him gladly? His work on *Sound* is a marvellous one! And how it strikes at the very *root* of Materialism, and that, as it seems to me, as no other hypothesis can! And, if my mind has not lost its rational faculty, he has thoroughly demolished the old Wave-Theory. And to what end? To the utter discomfiture of Materialists, so far as they depend on analytical argument. And that is, doubtless, their main ground of support.

I do not labor to defend Mr. Hall. I know little about him. But I admire his book, because, while its theories are unobjectionable, its positions are sustained by *facts* as the foundation of the most cogent logic.

Now, if it is not *so*, I know one can so point out his errors, and false reasonings, and illogical conclusions, as to reveal them to me. I think that I can say surely that I am open to see and to accept the truth. As I wrote before, if, in his treatment of Prof. Hæckel's argument from embryological "gills" in the human embryo, he has misrepresented him, that can be pointed out; but if he has truly represented the case, the professor's argument is a *sham*.

Will any scientific man undertake the task of candidly reviewing this book and pointing out some of its fundamental errors, for the sake of us, the uninitiated?

As regards Evolution, I have always regarded it as essentially Materialistic; I have never been able to see any place for it where God is admitted; and, if language means anything, those who adopt it must give up the Bible. The Rationalist has as much right to twist the positive declarations of the Scriptures in relation to the Christ, as Evolutionists have to do the same thing with other of its declarations to accommodate their hypothesis, with no facts to sustain it.

Mr. Hall may not be right; but he cannot be put down by ridicule, or by charges with no arguments to sustain them. Great and good men in the Church may ignore him, as the Materialists expect. They may let pass a precious opportunity for arresting a monstrous evil; but the truths taught in that book will live and bear fruit. They may say, "Have any of the Pharisees believed on him?" But thousands will drink in these truths.

Pardon my intrusion, and accept this note as the outflow of my Christian heart.

Yours truly, J. B. CLARK.

☞*Contributors* will remember that we have room in our standing list for only about 40 names. Some of these, who have no article in a given number, are dropped temporarily to give place to others who have. Of course no disrespect is meant, as our very best friends are among these changes.

INFIDEL OBJECTIONS TO THE RESURRECTION OF THE BODY.

BY REV. ALBERT B. KING.

The Church Universal has ever based its faith in the resurrection of the body upon the unmistakable and multitudinous assertions of God's Written Word. Among other texts we find in Daniel that "Many of them that sleep in the dust of the earth shall awake." In John V, our Saviour says: "The hour cometh, in which all that are in the tombs shall hear His voice, and shall come forth."* Out of the bosom of the nominal church are heard a few voices contradicting these Scriptures. Hymenaeus and Philetus are denounced by Paul for asserting "that the resurrection is past already," and thus overthrowing "the faith of some." The same heresy, better concealed from view under negations, has long invaded our modern pulpit. It has shown itself chiefly at funerals where frequently no allusion is made to the resurrection in the sermon or address, and the practical impression is made upon the audience, that at death the soul enters upon a career which in no respect differs from the biblical representations of the heavenly and eternal felicity of the saint at the resurrection and judgment. This magnifying the value of the soul through a belittling of the body is *now* further expanded by an *abuse* of the grand truth that when that substantial entity we call the soul leaves this world it takes with it the form of the body and therefore can hear and speak. But does this prove that the soul has reached at death its condition of highest and broadest activity? Does this prove that the saint has reached and holds the perfected salvation, and can now well afford to rejoice over an eternal separation from the body? No, brethren. Paul, speaking in 1 Cor. xv: 15, 30, declares that those who deny the resurrection are like to persons in the sleep of beastly intoxication (see New Version and the Greek). He says, 1 Cor. xv: 33, 34, "Be not deceived: evil company doth corrupt good manners. Awake up righteously and sin not; for some have no knowledge of God: I speak this to move you to shame." But what will move to blushes the man who permits his vain conceits to silence the repeated and trumpet-tongued declarations of his God and Savior as to the rising again of the body? Are we required to do more than point to the very texture, the warp and woof of the New Testament? Does not the burden of proof rest upon the man whose theory calls in question the very substance and marrow of the New Testament? What is this very texture, this very substance and marrow, if it is not the resurrection of the dead, the resurrection of the dead, the resurrection of the dead?

How strange it is that in 1883 any servant of Christ should be constrained to adopt for himself the language of Paul before the Sanhedrim—"touching the hope and resurrection of the dead I am called in question."

What is the value of the arguments attempted to be drawn from the Bible, to prove that in the case of those who have died "in the Lord" "the resurrection is passed already?"

Is it said that the fact that the Scriptures teach that spirits, freed from the body, see, hear and sing, proves either that they do not desire and need bodies, or that they have received already "spiritual" bodies? We answer, the souls of those who have "fallen asleep in Jesus" do not require in

*Most of the texts quoted in this article are in the language of the New Version.

Paradise or Heaven bodies in order to *communicate* with other pure (disembodied) spirits.

Has God a body? Yet God, the infinite and eternal Father, has a voice which was audible to Jesus and His disciples when upon earth.

However exalted and blessed the state of the saint may be, between death and the resurrection, there are two powerful arguments in favor of the proposition that until the resurrection the saint is lacking an important element in his salvation.

(1) Man only possesses the completed unity of his manhood when in possession of all its parts. These parts are soul *and body*. The penalty of sin is death, or the separation of soul and body.

The redemption that is by Christ Jesus is from the dominion of sin and its *consequences*. To remove, among other consequences, that of the *separation of the soul from the body*, our Saviour took upon Himself not only a human soul, but *must* take a human body like ours. This body suffered like ours, was crucified and laid in the tomb at death, His spirit going into the place of departed spirits, as must all the race. "In the spirit" He "preached to the spirits in prison." Could He have spoken without possessing a spirit-mouth? Did, then, the fact that He spoke prove that He had a spiritual body? If you answer, yes, then you give the lie direct to the Word of God and to the Lord Himself and His apostles and angel, for if it is possible to state anything with unmistakable plainness, then do all these witnesses agree in stating with the emphasis of a bugle-blast that the man Christ Jesus, in the state of the dead, was up to the morning of the first day of the week, a spirit without a body, but that on the morning of that day, His body rose from the tomb. In continuation, this "same Jesus," on the day of His ascension, was seen by His disciples to rise from the earth with the human body they had handled, and seen eat, walk, and speak. The last view of Him was His body disappearing out of sight. This fact filled their hearts with triumphant joy. In continuation, Stephen and John saw His glorified body in Heaven. On Ascension day the angels assure the disciples that Jesus will come again with a body the same as that taken into Heaven. Bearing in mind that the disciple is like his Lord, brother and head in sharing the fruits of the victory of the Captain of his Salvation, it follows, without doubt, that Christ's brethren and members must have their bodies raised from the dead, or else there is a fatal flaw in our title to Salvation in Christ, and, then, when we die, we perish. If *we* do not rise, Christ is not risen, and we are "still in our sins." This is the argument of Paul, in 1 Cor. 15.

If it is said that Christ did not have a spiritual body in the intermediate state, then does it follow that between death and the resurrection we have no spiritual bodies, and, until our bodies shall rise in the image of Christ's glorified body, our salvation is incomplete.

(2) Judging from analogy, we conclude, that as the old earth made necessary our possession of a substantial and permanent body by which to hold constant intercourse with sensible objects, so we will need the senses of the spiritual, yet real, body with which to hold closest and permanent relations to things on the "new earth." God has not made us angels, but men, and as such the body must be redeemed as integral part of us.

Surely 1 Cor. 15: 54, and 2 Cor. 5: 4, do not teach, even when tortured and twisted by the hot pinchers of a pet theory, that the spiritual body is given us at death. Paul cannot stultify himself. As the climax to an elaborate argument to prove the literal resurrection of the body at the second coming of Christ, he says: "*then* shall be brought to pass the saying that is written, Death is swallowed up victoriously," and *not until* then. Turn now to 2 Cor. 5: 1–4. A primary rule of interpretation requires that a doubtful or obscure passage shall not weigh against a multitude of emphatic, clear and concurrent texts. Doubtless, when the dilapidated hut we now inhabit is removed, there awaits our occupation a palace, a spiritual body. But *when* we shall move into our palace, Paul does not inform us in 2 Cor. 5; but he and the Lord Himself do, in other places, tell us beyond a doubt that it will be at the sound of the trumpet, at the voice of the Son of God, and when the sleeping dead come to judgment. Although in the passage Paul rejoices in the prospect that at death his *soul* shall be with the Lord, he is far from rejoicing over the fact that between death and the resurrection he will be waiting for his spiritual body. Looking closely at 2 Cor. 5, and comparing Paul with Paul, it is as if he said, "do not suppose I am so foolish as to rejoice in existence without a body ('not for that we would be unclothed'), but I am glad in the thought of my spirit being near the Savior, and I await in glad, eager expectancy, the completion of my 'adoption,' even the '*redemption* of our *body*.'"

What light do we get outside the Bible and Christianity? Examine Spiritism. Is it real? Is the phenomena produced by the action of spirits? Do you say, yes? Then their actions (which speak louder than words) declare that after death the soul has no body before resurrection, for lost spirits in our day, as in the time of our Lord, strenuously direct their efforts to regain possession of human bodies, showing that they exist unclothed, and feel it to be very desirable to have some houses to live in. Do you say Spiritism is human trickery or Satanic delusion? Well, then, the Spiritist and modern Hymeneus, or Alexander, teach one and the same "doctrine of devils," namely, that at death, the soul, "glad to leave its cumbrous clay," will now soar into successive bright and happy celestial spheres, and that the resurrection of the body is preposterous, and if it could be, would be injurious to the soul.

Let Nature teach us. That all things do not lose their living principle when apparently dead is seen every Spring. Even where plants actually decay and dissolve, and pass into chemical atoms, even then if we will patiently await its time, there will arise from the decayed seed a beautiful plant or magnificent tree truly unlike in appearance its seed. Paul says this illustrates the resurrection. Our bodies do decay in the earth, but, as with plants, there is an *indestructible principle*, which after hybernating through the wintry season of the earth's probation, shall, at the Easter morning of the race, spring into life and beauty.

If our bodies in the grave do not contain an indestructible, though now sleeping germ of life, then was Satan a fool in snatching at the body of Moses. Then was Michael a greater fool in contending for its possession, when he might have had as many chemical atoms, or more, by claiming the carcass of some old horse. And what was the extent of Paul's folly in delivering into Satan's hands, with solemn display of judicial severity, so many quarts of animal fluids, or cubic feet of human gases? Two angels with faces like lightning watched over the dust of Jesus. And if they watch over the immortal germs of our spiritual bodies, as we sleep in Jesus, shall we be surprised? What new force does all this give to such phrases as: "We are members of

His body, flesh and bones; "Saviour of the *body;*" "May your spirit, soul *and body* be preserved entire, without blame at the presence of our Lord, Jesus Christ."

And shall we not in the future give a child-like, whole-hearted trust to the entire Scriptures, believing alike that the whale swallowed and disgorged Jonah, and that the earth, which swallows our bodies, shall, at the command of the Lord, yield our bodies made like unto Himself?

GOD'S POWER, GOODNESS, FOREKNOWLEDGE, AND THE POWER OF FAITH.

BY COL. ROBERT TANSILL.

Assuming, as we cannot but do, that all God's attributes are infinite and eternal, it seems to follow as a necessary corollary, that He has the power, at the same time, to know some things as well as not to know others, should He, in His wisdom, so choose. If this be not true, then we must suppose His power to be limited, which is a dangerous supposition. But, strictly speaking, the term foreknowledge cannot properly be applied to God, as His attributes have neither beginning nor end; hence He can absolutely know all things just as they are, "whether past, present, or future." Still, it may not be unreasonable to suppose that, although God has the absolute power to know all events, actions and things whatever, yet it may not be necessary for Him to exercise it so as to know all sorts of events and actions, in order to His carrying on the government of the universe in the best possible manner. For instance, it may not be necessary, in His government of the moral world, for Him to know that a particular person went to mill on a certain day, nor the amount of grist he carried; that another man worked his garden in the forenoon of a certain day, and gathered peaches in the evening of the same day. If God cannot help knowing all the actions of men when they occur, then He must be governed by a law of necessity, which He did not make; consequently He is not free in His actions. And if He is not absolutely free to know and act as He may desire, then He must be subjected to some power greater than His own, to suppose which is a species of heresy.

According to the above supposition, plainly, I think, not an incredible one, God's knowledge may be so exercised as only to know all such events, actions, and things as are essential for Him to know, in order to fulfill His present and final purpose, in reference to all creatures and things under His government. Or it may be sufficient for His purpose only to know all such actions of men as are ethical, and not all those which are non-ethical. In other words, though it may not be necessary for God to know all the actions of men at the time they occur, still He can and will know them all at the appointed time of judgment. Whether this be so or not, we cannot possibly know in our present state, nor is it at all certain that if we possessed such knowledge it would be of any benefit to us. The fact that we do not possess such knowledge, shows that it is best for us not to have it.

As it is written, that nothing is impossible with God, so everything must be possible with Him. Therefore, any supposition or reasoning which limits his power is contradictory to Scripture, as well as to our natural conceptions of His attributes. Indeed, "our whole nature leads us to ascribe all" power and moral perfection to God, and to deny all imperfection of Him." From this intuitive conviction, which "is the voice of God speaking in us," we conclude that such is God's wisdom, goodness, and power; that it is as much impossible for Him to sin, or to do an unwise act, as it is for a stone to speak, or move itself. Therefore, whatever God does is right; and because He cannot do wrong, He is the ultimate standard of right, and His example, as manifested in the life of Christ, and His laws, are an unchangeable rule and guide for us. But though God must, in the nature of things, have the power to do wrong, yet He ever has, and always will, do right. Some good persons may be surprised or offended at its even being supposed that God can do wrong. It should be remembered, however, that if He could not do wrong, His power would not be infinite. The power to do right and wrong exist, and are inseparable; hence a power to do right necessarily carries with it the power to do wrong; for, according to our understanding, there would be no merit in God's doing right, if He could not possibly act otherwise. This appears to be the true logical way of viewing this question, and going further is beyond the power of human understanding. It is here we reach a barrier, erected by the author of Nature, which our reason cannot penetrate, and which must ever remain a veil to human prescience, until the restitution of all things.

To assert, as is often done, that God cannot work a contradiction, is exceedingly absurd, because we do not know, nor can we possibly know, what is, or would be, a contradiction, in the conduct of the Creator and Governor of all things; for it is clearly evident that that which, in His conduct, might appear to us contradictory or wrong, might, for ought we know, be wise and good in the highest possible degree. It is therefore manifest that our ignorance of the power of God is a complete answer to all such notions as would circumscribe it. It is also said by some writers on this subject, as an evidence that the power of God is limited, that He cannot make two and two equal to five, which seems to be the absence of a proper conception of His Divine nature, as well as sound thought and reasoning on the subject. There is such a thing in Nature as the eternal "fitness and unfitness of actions," and it may be a sufficient reply to all such speculations as deny the absolute power of Jehovah, to suppose that those actions and things, which it is contended he cannot do, may not be matters for the exercise of His power, because not necessary in His plan of government, any more than it is necessary for a king, in the proper discharge of the important functions of his high office, to engage in certain menial employments, though he could as easily do so as God may do the things it is supposed He cannot do. Or it may be a more satisfactory explanation of the matter to observe that, as the system of unit numbers is natural, it may be so changed by the Author of Nature, or that a rule for the combination of numbers might be so made as that twice two should stand for five, and three and two for four. However, be these things as they may, we may rest assured that all suppositions, reasonings, or interpretations of Scripture which limit, in any way or degree, the power of God, are wrong. The evidences for God's boundless power, and the truth of religion, are seen in all things, in such ways and degrees as to be apodeictical; and it is as dangerous a neglect of the understanding not to discover these proofs, as it is in the "moral character," when discovered, not to believe and be gov-

erned by them. Our incapacity to know how God may do a thing is no proof that he cannot do it. That which the light of reason and experience cannot discover in spiritual things, real faith accepts as true, and closes the debate. And what is faith, if it be not that vital force of our nature by which we live, move, and act? If this be true, and I think it is true, it would be as much impossible for a man, entirely divested of faith, to live, as it would be for him to breathe without lungs or air. The Christian religion was established in the world by faith, against the greatest discouragements and persecution from temporal power, and now all the affairs of this life are more or less carried on and hallowed by faith. True faith in religion, which includes belief in God's omnipotence, keeps the commandments, gives concord, stability, and glory to nations. And what would man be without faith in anything? Evidently lifeless matter, or, at best, brute life. Let those who may doubt that faith is the vital and animating power of our nature, imagine what they would be, or could be, if totally deprived of faith in all spiritual and temporal matters, and they may possibly find more reason to question their own judgment, than the reasonableness or truth of these reflections. But I am digressing. To resume:

All such ideas or speculations, as those referred to, or any other, to prove a limitation of God's power, not only have a tendency to incline weak and ignorant people to atheistical beliefs, but are not conformable to philosophical discussion, because they reduce God to the level and nature of man, which is irreverent. To undertake to disprove our natural conviction of long-established truths, by the imagination, is an evidence of weakness, rather than wisdom. There are innumerable things in Nature which surpass our understanding, and not to believe in anything but what we understand is the acme of folly. It is as much impossible for finite minds to fully comprehend the nature and power of the Author of Nature, and all His laws or reasons for them, as it is for "a bird to fly in a vacuum." Where our reason and experience in religion end, faith is intended to commence. The insolvable mysteries pertaining to God and religion are not matters for human inquiry, but faith; and it is our duty to believe them as a wise and necessary part of the Divine system of the moral world. We know, or can know, enough for the acceptance and practice of religion, which is sufficient, and is all the Author of Nature intended we should know here. If we knew the nature and power of God, as we do those of man, we would not be the beings we are, and another system of government would be required for our changed nature. It is but just to remark, however, that opinions which question or deny God's absolute power in any thing, are not conclusive evidence of the absence of religious faith in those who entertain them, as they may be the consequence of an overwrought imagination on the subject, which is never satisfied with following the eternal laws of Nature, but often prefers what is mysterious, terrible, and wonderful, to what is obvious and reasonable. The imagination, like any other of our mental faculties, may be so perverted, by an excessive use of it, as to be a curse or a blessing, as is proved by the sad fate of so many poets, whose imaginations, "like the troubled sea, are never at rest." Although this faculty is a natural and necessary one, it is not intended, nor should it be permitted, to overthrow those legitimate deductions and inferences which we are to make or to draw from facts, reason, and experience, and by which we can alone judge reasonably or safely of anything in Nature. The antidote for an imprudent indulgence of the imagination, in spiritual things, is more faith in them and a better knowledge of God's laws, from which we may more accurately infer His true nature, our duty to Him, and to one another, as responsible moral agents.

The simple and practical way in which I have considered these important questions, may, to such persons as only take a hasty and partial view of them, appear weak, or even absurd, but it is surely not more so than the suppositions or reasoning referred to, which would, if true, not only deprive God of His omnipotence, but overturn the great scheme of Christianity itself. And were it universally believed that there is no God, and that religion is fictitious, such beliefs would destroy the natural, just, and wise moral rule of life, which religion prescribes and enjoins, and reduce society to the forlorn and miserable condition of the crew of a ship in a hurricane on a lee shore without compass or rudder, as men would then only be restrained from crime by the fear of the punishment which human laws inflict; for it is certain that just in proportion as men disbelieve in God they disregard the Divine and just precepts of religion, and assimilate, in their nature and actions, to the merciless hyena or the cunning and thievish fox, while they hypocritically profess, from shame and fear of public opinion, to be wiser and better than the Great Jehovah himself, which is the tribute vice unavoidably renders to virtue. Faith, virtue, and reason are the lights which give a life of endless felicity and glory to man. Without these blessings, all is confusion, darkness, shame, and misery.

Lastly, and in brief, God's power, like His knowledge, is pure, without degrees, absolute, existing before and independent of any other cause, substance, or thing whatever besides Himself, without beginning, and therefore everlasting.

A MENTAL PHENOMENON.

BY REV. F. H. BURDICK.

There is a phase of the working of the mind upon which the writer does not recollect to have seen a printed word.

Unless that chapter in *Upham's Mental Philosophy*, in which he treats of the "Prejudices: their causes and removal," can include and illustrate the tendancy. Or, unless it would be treated as an "Influence of the Will in Intellectual Judgments," as in *Mahan on the Will*.

It is the certain bias, or set of the mind, which, when the mind is startled by the news of an accident, or tragedy, by a sort of fatal, instantaneous logic, so quickly connects effect with cause, that it ends in what looks like a wish that the victim shall die.

The injured one never harmed you. You do not know him personally. There can be no malice in it.

Let us illustrate it. There suddenly comes to your knowledge the news of an accident. For example: a neighbor passing, hurriedly calls out, "Man fall'n off roof of barn!" That fact is in possession of your knowledge, and only that. It is absolutely all you know about it. But, instantly, such is your habitude, you seize upon the fact, and make out a case something like this: B is the only man in the village who puts slate on the roofs of barns; therefore, it must be he. He is, of course,

dead; for a man who fell off a barn twenty years ago, died from the effects of it. Therefore, this man is already dead.

But, another neighbor, in passing, says: "Yes; it is he, but he is still living!" Then your determination says: "He may be living, but death is only a question of time. He shall die eventually." And, if he lives, there is a *disappointment.* Do not be startled when I say "disappointment." Is it not a fact, that you conceded your disappointment, when you said: "I am *happily* disappointed that he has got well, for I *felt* that he could not live"? Does not the qualifier hide the fateful tendency? You may be the dearest friend of the man, but you have been swayed into inharmonious mental action, until hope is beclouded.

This phase might be amplified from illustrious examples.

The writer, when a boy, remembers hearing a certain man read a telegraphic dispatch: "President Lincoln shot!" From a practical knowledge of what comes, usually, to bodies shot in vital parts, death stood at the other end of causation, as the only consequent of the assassin's bullet. Men wept for President Garfield's death before he died. The writer remembers vividly, how, in those days of our recent national sorrow, he met a lady who confessed this fateful appetency, even in the light of facts that should have incited hope for the dying President. And how, when she was made to see that it is not, necessarily, a sinful bias, but an intellectual prejudice, there comes a sense of relief to her.

There are, however, some symmetrical minds who never yield to it. They are surprised that one who is amiable and hopeful, can display such an apparently strange tendency.

Now, psychologically, what is it?

Indirectly it is of the intellect, susceptibility, and the will. Each and every faculty has a part. But directly, that is, phenomenally, it is emotional and voluntary. For emotion, impelling the volition, and securing its concurrence gives the wish which *cherished*, may be, "malace aforethought," for ought we know. And in saying that it is of the phenomena of the sensibility and will, and not of the intellect, we shall not seem to vitiate the unity of the soul.

The intellect furnishes the facts of the prejudgment, but it is not an actor in the phenomenon. All the part it played was in the phenomena of cognition. In the absence of positive data, the intellect cannot make assertions.

This trend of the mind is a sort of necessitarianism. As if, an antecedent given, one and only one consequent could follow. But a second thought, founded on our experience, shows us that either of three or four consequents may follow. A man who falls off a barn may not be hurt at all; he may recover; he may be crippled for life, or he may die. He has recovered, much to our "disappointment," intellectually and prejudicially. Hence, in the doctrine of necessity, we are forced to posit a new antecedent, and that is, the man did not fatally fall off the barn. So, then, we are back again at cognition, where we belong. Beyond it, we should not go, until all the facts are in. In our liberty of choice in our own misfortunes and accidents, "we hope against hope." Why not for others in their haps and mishaps? There should be that harmony of the soul, in its unitary action, that makes the intellectual symmetry and sympathy in the presence of the seeming necessitous.

☞For terms of *Universalism Against Itself* and MICROCOSM, see last page of cover.

THE NEW DEPARTURE ON SOUND.

We hear from several professors of physical science in our colleges, who, when approached on the subject, speak very disparagingly and even contemptuously of the New Departure on Sound, as published in the "*Problem of Human Life.*" But almost uniformly, when questioned upon the matter, they admit they have not read the treatise, and many of them declare that it is not worth reading! So those professors, in all probability, will die without ever having their eyes opened upon this important scientific question, all on account of a prejudice that is totally unbecoming and even unpardonable in physical investigators.

But in the midst of these evidences of scholastic bigotry, it is gratifying to learn of constant new recruits in professors of physics and even presidents of colleges, who unequivocally indorse the new departure in acoustics, and who confess, after a thorough reading, that the old theory of air-waves has seen its day and has scientifically broken down. Letters to this effect we are constantly receiving, and which appear in marked contrast with the blindfold criticisms referred to above.

The following letter from Dr. Nash, President of the University of Des Moines, who carefully read the treatise before he wrote, speaks volumes against the self-consequential sneerers:

DES MOINES, IOWA, Dec. 20, 1882

Wilford Hall: Dear Sir:—

I received, some time ago, in pamphlet form, your treatise on the "*Evolution of Sound.*" I have been reading the work with great interest and amazement. I read until the light became almost *blinding!* I turned back to re-examine, but your positions are fortified with such resistless proofs that the teachings of the school-room, from boyhood on, now seem to vanish away like mist before the rising sun. Go on! You are doing a great work. THE MICROCOSM has been received and perused with profound pleasure. You compel your readers to *think*, and then to *believe.*

Yours truly, J. A. NASH.

LETTER FROM DR. BALSBAUGH.

My Beloved Wilford:

The January MICROCOSM has been received and examined. It is a gem that outshines all its predecessors. More and more am I convinced that your work is God-timed. To devote yourself to your grand mission in this consciousness, will constantly bring you strength and light. Never let a thought cross your mind that your solution of the problem of life will be successfully controverted. God will maintain His own, though "the heathen rage and the people imagine a vain thing." The Omnicient I AM has made all truth one, and science is His indorsement of the higher revelation. Tyndall, Huxley and Hæckel, with a host of other ingenious, industrious pseudo-scientists, have paved the way by their acute, half-true sophisms for the higher scientific demonstrations of the Divine existence and of human immortality. In Hæckel's atheistic onslaughts against all religion he is actually forced to acknowledge the exact equivalent of an intelligent, personal God, if he would make any pretense to a possible "spontaneous generation" appear plausible. And so of all the others who think they can publish one fact of science without manifestly publishing and proclaiming the absolute immanence of God in Nature, and thus virtually admitting the authenticity of

the Bible. Mayer has proved himself anything but a manly scientist. Hitchcock of the *Microscopical Journal*, is, in very truth, a "fossil." Many of these men who think they are doing God's service will verily be found fighting against God. Their blind devotion to old theories, because they bear the stamp of great names, will bring them the pity and contempt of future generations. Amen and Amen to Dr. Swander's "Equipoise" of the man whom God has elected to blast Darwinism and check the career of this modern anti-Christ. Keep your *balance*, my dear brother, by living in that life in which are hid all the treasures of wisdom and knowledge (Col. ii : 3). Dr. Van Dyke is a host. He makes thorough work, and every blow counts. But poor Beecher! A star of the first magnitude fallen into the blackness of darkness of infidel speculation! We are now to have a monkey-Christ, proclaimed from the pulpit by a monkey-bred preacher! What a gospel! One step more and he will be wallowing in the disgusting mire of Hæckelian atheism. Let men and angels weep over such a fall! Is this the boasted progress of the nineteenth century? Shame! Shame! C. H. BALSBAUGH

UNION DEPOSIT, Pa., Jan. 13, 1883.

SOMETHING NEW IN SOUND.

BY CAPT. R. KELSO CARTER.

I take pleasure in presenting the readers of THE MICROCOSM with a genuine curiosity; an utter impossibility in sound, according to *theory*, but a fact of experimental work notwithstanding. Briefly, it is this: I recently had the privilege of hearing the celebrated brass band instrument maker of Philadelphia—Mr. Henry Distin—play upon the Tuba. This instrument, as is well known, is a large bass horn, giving a deep mellow, note. Now, it is well known to all acousticians, that a certain tube, used as a trumpet, will sound one fundamental tone and then a succession of six or seven harmonics, forming an agreeable chord with the lowest tone. It is also well known by students of the wave-theory, that the explanation in brief for the above is that the vibrating column of air in the tube splits up into a different number of segments for each harmonic; and further, it is always claimed and believed that only these half dozen notes can possibly be produced with that tube. In order to produce the rest of the scale, the three pistons or valves are added, each of which adds a different length of tube to the horn, thus in effect substituting another tube with its own set of fundamental and harmonic tones.

Now the bare *fact* is that notwithstanding all this *theory*, Mr. Henry Distin played twice in my hearing, an entire aria from Weber's opera of *"Freyschutz," without touching a single valve.* The *aria* is called, I think, "Soldier's Chorus." I am not certain of the name; but it contains *every note of the scale within a compass of one octave and a half.* More than that, he always make the shake, or trill, without using the valves, *no matter where it occurs.* Every horn player knows the theoretical impossibility of playing two *adjacent* notes on the same tube. Yet he does it easily and neatly.

But this is not all. As if to cap the climax of impossibilities, he readily plays *two notes at once* upon his tuba; sometimes plays three at once, and even manages to partially produce a fourth. I have conversed with him upon the subject and obtained all the explanation he can give concerning his marvelous performance. It only amounts to the statement that long and diligent practice brought about the result. He has had some amusing rencontres with bandmasters and others who have laughed to scorn his proposition to play a tune without the pistons, but who have been amazed to the very limit of human astonishment by the ready performance of his boast. I have no explanation to offer. If the wave-theory can fit it, I know every student and instructor will be delighted to see the thing accomplished.

Will Prof. Mayer study over it, and if he finds it "too many for him," send it to Profs. Tyndall and Helmholz for elucidation?

Certain it is that it is very discouraging for the wave-theory. According to the latter, the same tube must vibrate *in toto*, or in a number of segments corresponding to its harmonic sounds; *and in no other way.* Yet here we find the same tube producing one note after another for one and a half octaves, including semi-tones and trills; and to do this it must vibrate to each in some mysterious way. The disregard to the feelings and principles of the wave-theory shown by these vagrant notes, is simply shocking.

PA. MIL. ACAD., Jan. 1883.

PROF. DOZIER'S MOON-HELL.

We are overwhelmed with replies to Prof. Dozier's fanciful article in the Dec. MICROCOSM on the supposed locality of Heaven and Hell. We greatly fear our contributors are taking the matter too seriously. We suspected when we published that elegantly constructed hypothesis that it was intended more as a philosophical fancy than a serious attempt to give a real or scriptural view of the localities so graphically described. Our readers are often so matter-of-fact that they will not permit the least play of the imagination. We give elsewhere one reply to Prof, Dozier, as an illustration of about a dozen overwhelming annihilations of the Professor's sage but *luny* hypothesis.

TRANSIT OF VENUS.

We referred last month to the great astronomical event above-named, and to its probable importance to the cause of science. We expressed our doubts about its ever benefiting the world commercially to the value of saving a single mariner's life, by adding to the accuracy of nautical observations. In fact, the comparison of many different observations, at widely separate stations, have given very unsatisfactory results, making a difference of fully two minutes in the variation of the contact records when reduced to Washington time. This is a serious disappointment to science, to say the least, as it leaves more confusion than even before as to the sun's actual distance from the earth. This, however, may possibly be partially, if not wholly, obviated by a comparison of the numerous photographs which were successfully taken at nearly all the stations where clear weather prevailed. Surely such exhibits, with the absolute time of their production, can scarcely fail to reconcile the unaccountable discrepancies in the contact records. But whatever the accuracy attained or attainable, we doubt if the result will ever justify the millions of dollars outlay to achieve it; especially while so many vastly more practical questions of science are ignored as not worthy of a thousandth part of the expenditure.

WILFORD'S ÷ MICROCOSM.

23 Park Row, New York, Feb., 1883.

A. WILFORD HALL, Ph.D., Editor and Prop'r

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J. R. HOFFER, Esq.....Mt. Joy, Pa.
Prof. JAS. W. LOWBER, Ph.D.,.....Lancaster, Ky.
Rev. J. J. SMITH, D.D.....Haverstraw, N. Y.
Rev. Prof. STEPHEN WOOD.....Lost Nation, Iowa.
Rev. F. HAMLIN.....Poughkeepsie, N. Y.
Prof. W. H. H. MUSICK.....Vandalia, Mo.
Prof. W. H. SLINGERLAND, Ph.B...Abingdon, Ill.
B. S. TAYLOR, M.D.....Escanaba, Mich.
Prof. HENRY C. COX, A.M.....Pontiac, Ill.
B. T. KAVANAUGH, M.D., D.D...Mt. Sterling, Ky.
Rev. Prof. S. B. GOODENOW...Battle Creek, Iowa.
Rev. GUSTAVE REICHE.....Boonville, Mo.
Rev. M. STONE, D.D.....Omaha, Neb.
Rev. JOS. S. VAN DYKE.....Cranbury, N. J.
PROF. M. DOZIER, A.M.,.....Santa Rosa, Cal.
REV. T. M. GRIFFITH,.....Tamaqua, Pa.
PROF. H. S. Schell, A. M.,.....New York.
J. W. ROBERTS, Esq.,.....Oskaloosa, Kansas.
Rev. THOMAS NIELD.....Elmira, Mich.
Rev. W. G. HILLMAN.....Jefferson, Iowa.
THEOPHILUS BRAY.....Washington, D. C.

SPECIAL NOTICE.

In our conduct of this journal we desire to give our list of excellent contributors the widest possible latitude for the conveyance of their honest convictions, so long, at least, as this liberty does not conflict with the general aim and scope of THE MICROCOSM. But we wish our readers definitely to understand that we do not hold ourself responsible for the views of our contributors, nor, in fact, even for our own views, as we are liable at any time to change ground on receiving more light, as we have done more than once since this paper was commenced. But, generally, we hope and aim to be consistent. EDITOR.

THE PRAYER-CURE.

There is considerable interest manifested at the present time in different parts of the country upon this question, of the reality of *prayer-cure*, or *faith-cure*, as it is frequently termed. Many orthodox and sincere clergymen of different denominations are now firm believers in the practical exemplification of this doctrine, as it is admittedly taught in the New Testament. There can be no possible dispute in regard to the meaning of the Apostle's language, when he declares that a sick person may be healed by the laying on of hands and the anointing with oil, accompanied with faith and prayer. He positively affirms that "The prayer of faith shall save the sick." But it has always been a question with conservative Christians whether this did not relate to the age of miracles, or whether it was not among those powers employed in the early times of the Church for the confirmation of the mission of Christ and the apostles. In fact, the orthodox churches and ministers, until quite recently, have, with a very few exceptions, totally repudiated the doctrine as applicable to the present state and age of the Church. Hence, when the Mormon Church sprung up some fifty years ago, and their elders practiced the anointing with oil, and claimed to heal the sick by laying on of hands, etc., the evangelical denominations, without exception, looked upon them as fanatics and deceivers, and their followers as dupes to be regarded with pity. Clearly we can see no substantial difference in this mode of healing the sick, restoring the blind to sight, making the lame to walk and the dumb to speak and sing, and the more marked exhibition of miraculous power in actually raising the dead to life, as was publicly claimed to be done by those Mormon elders. Yet it is a fact that prominent evangelical ministers in this city and Boston are now seriously claiming to put into practice the apostle's teaching, by anointing the sick with oil and laying on of hands, just as did those tabooed Mormon elders; and are actually claiming, as the practical result, the cure of hundreds of the otherwise incurably sick, lame, blind, deaf and dumb. More than this, the same hundreds of sick, crippled and deformed persons rise in public assemblies and declare themselves perfectly cured of their various maladies; some of them even lame, blind, or deformed from birth. This is all that the Mormons have ever claimed to do, with the bare exception of raising the dead to life—which we believe the modern prayer-cure advocates have not as yet claimed to accomplish, or possibly have not attempted. But we see no difference in the *nature* of these diverse miraculous effects, the difference being simply in the extent to which the interposition of supernatural power is exerted.

The Rev. Albert B. Simpson, who has been holding prayer-cure meetings in this city for some time,

gives public exhibitions of scores of men and women who rise at his invitation and declare themselves to have been healed, many of them of incurable diseases, alone by following the directions of the apostle.

The reverend preacher claims that the evidences of the divine origin and authenticity of the Scriptures are not now sufficient to satisfy the skeptical tendency of our minds without these supernatural confirmations. We quote his words as uttered in a sermon which he preached at the Grand Opera House, in this city, on the 29th of December last. He said: "It is a great comfort to me to be able to prove the reality of the Christian religion by evidences that all can see. The truth of the Bible can never be demonstrated by tracing old manuscripts to their source. Everything that has been produced in that line is rubbish. But I can ask the unbeliever: 'What would convince you? Would you be satisfied with the complete and supernatural cure of a hopeless case of consumption? Or the withering away of a cancer, without the use of medicine?' Thank God, I can take the unbeliever to the homes of simple men and women who have been thus cured, and then say to them: *'Disbelieve now, if you dare.'* "

This is evidently what the skeptical, and especially the materialistic, mind wants, if it can be had. The only question is: Can such evidence be produced? or, Is this another case of mental hallucination or delusion, as in the case of honest believers in Spiritualism? Of course, no one can charge this prayer-cure practice as trickery or intentional deception, as in the slate-writing tricks of Slade, Watkins, Phillips, and others. These latter exhibit their tricks for money, which is *prima facia* evidence to every Christian believer that they are not of God, since the apostle positively declares that such miraculous gifts of God cannot be bartered or bought for money. But the prayer-cure advocates of course dispense their healing mercies without money and without price. Still, although this is a decided point in their favor, does it prove the healing to be genuine, as the result of *supernatural interposition?* May not the mental and nervous condition of the patient be so influenced by a complete faith in, and an unreserved surrender to the remedy proposed, as to effect a physiological reaction and revolution, and thus accomplish the organic results witnessed? And now, we ask, is it a fact that a single case of cure, such as that of a deformed, blind or deaf person, can be produced as the result of following the apostle's directions? We must confess that we seriously doubt that one such case can be pointed to by Mr. Simpson, or anyone else, any more than they could be produced by Joseph Smith or Sidney Rigdon, when challenged by their opposers forty or fifty years ago. We believe that cases of sickness have been cured both then and recently in the manner described; but cannot all such cases be accounted for, psychologically, in the manner hinted at above, without involving supernatural or miraculous power? In fact, we have heard of doctors who would give certain patients, even in bad cases of fever, pills of *bread*, and by letting them think they were taking powerful cathartics, would effect a cure without a particle of real medicine! May not these prayer-cure cases, now creating such excitement throughout the country, be caused by a similar working principle, as the result of that mysterious influence which the mind is known to exert upon the physical organism under certain conditions?

One of our ablest and best educated contributors, a professor of physical science and mathematics in a leading college, believes that he was cured by prayer, in connection with the laying on of hands and anointing with oil. He became convinced that he was afflicted with an incurable attack of heart disease. No medicine or usual treatment would reach it or produce the least effect. As a last resort, he went to Boston, Massachusetts; and under the instruction and assistance of one of the leading ministers of the faith-cure practice, surrendered body and soul and spirit to what was claimed to be supernatural power, and came away, as he asserts, perfectly healed, and is now in robust health, as we had the pleasure of witnessing a few weeks ago, when he called at this office. But still we ask, was not this last act of resignation of the whole mind and body to a desperate hope the final psychological crisis that so acted on the circulation as effectually to reach the seat of the disease and produce the change desired?

We wish to state distinctly that we do not deny the truth or the genuineness of these prayer-cure cases. We only express our doubts. As a religionist, we would be only too glad of the opportunity of demonstrating, by such physical tests, the actual personal immanence of God in the temporal affairs of the children of men, the same as recorded in olden times when the lame were made to walk and the blind to see. But as a scientific investigator we must look at things philosophically, and not hastily jump at conclusions, though, as a scientist, we are equally interested, and equally anxious, that these prayer-cure claims should be substantiated beyond all possibility of dispute; for then materialism, and every form of skepticism, would at once be banished from the earth, as no amount of preaching or ordinary Christian influence could ever accomplish. If the many ministers who believe in this *new* departure in supernatural interposition, are positively certain that cases of actual prayer-cure have occurred which were not the result of natural or psychological influences, let them join with us in inaugurating a movement for a general convention to which all cases of incurable disease and deformity, including

well-known cases of blindness, deafness, lameness, etc., shall be invited, for the purposes of absolute tests of this doctrine, and we will send the announcement of such convocation broadcast all over the land through the columns of THE MICROCOSM. Nay, more, we pledge ourself to be present at such assembly to join with all believers in praying to God, with all the fervor and faith we can muster for the successful result of such a most desirable test. The experiment here suggested cannot be objectionable to the mind of God, nor distasteful to good men, as its aim and object can only be the greatest possible good of the human race.

We therefore sincerely suggest the matter to the Rev. Mr. Simpson, the Rev. Evangelist Barnes, and other sincere ministers, and trust that they will not delay in starting the movement here suggested.

IS ELECTRIC LIGHTING A SUCCESS?

Up to the present writing, it would seem that the prospects of the electric light superseding gas-light are anything but encouraging. The enthusiasm which greeted the introduction of the electric light into this city, some four years ago, gave assurances that the days of gas were numbered. Particularly was this the case under the excitement produced by the furor attending the Edison discoveries, or rather pretended discoveries, since not one of them has come anywhere near equaling expectation, while the most exciting of them totally failed to operate. It was first announced in the city papers that Mr. Edison's new process of electric lighting would supersede gas so completely that the latter would have to be sold at less than one dollar per thousand feet, to be used either for public or private purposes. This furor raged to such extent that gas-stocks tumbled ruinously, both in this country and in Europe, forcing the poor who had all their savings in those securities to sell out for what they could get rather than lose all, as they supposed, inevitably. So sure were capitalists, from the intensity of the excitement, that the man who had invented the *phonograph* could do what he claimed, that they bought up eagerly the stock of the Edison Electric Light Co. at enormous figures. But where is that stock now? The great patents, which were the basis of the whole excitement, founded upon the *thermostat*—or the mode of regulating the incandescence of a platinum coil of wire by the expansion of a heated bar—soon proved to be worthless, besides since proving to be an old discovery, the invention of a certain Mr. Maxim. From this incandescent coil of wire, though valueless except to lead to valuable researches for platinum mines, grew the employment of a carbon loop in an exhausted glass globe, producing a mild, though not very strong, light—nothing in fact to compare with the weakest arc-light seen along our street. This carbon mode of producing an incandescent light was, however, a pure accident, stumbled upon by Mr. Edison in his desperation while witnessing and perspiring under his total failure with the use of platinum wire—so that the entire foundation for the excitement that had caused such a fall in gas-stocks throughout the world has now disappeared as completely as if it had never been thought of! It shows how cautious we should be in receiving all great and exciting announcements before the foundation principles, upon which they claim to be based, have developed, or even been tested. Little has been said in the public press in regard to that notable and stupendous fiasco and the almost preposterous disproportion between the heralding flourish of trumpets and the insignificant results. By common consent, the journalistic world seemed to keep silent, out of respect for the disappointed inventor.

But the accidental carbon-loop discovery, which chanced to come to the aid of the great but disconcerted Edison, has now been tried on a considerable scale in this city. Whole buildings, and even blocks, are now lighted by this incandescent lamp. Is it a financial success, as compared with gas? We learn that it is not, and that in all probability more than double as much will finally have to be charged as for the same amount of light by coal gas, unless the company decides to lose money for the sake of keeping up appearances which cannot long be kept up. Let the company give us the actual sworn figures of cash outlay, aside from the plant, at the end of the first six months, with a statement of the actual candle-power furnished, compared with gas, and we will publish the result; though we now predict that it will prove to be more than double the cost of gas, with some advantages over gas, but, probably, more disadvantages, all things considered. Even the arc-light—the cheapest mode of producing electric light, by all odds, that has so far been discovered—has been proved in London to be vastly more expensive than an equivalent amount of candle-power by means of coal gas. We copy the following from a daily paper:

"In a recent address, as Chairman of the Council of the London Society of Arts, Dr. C. W. Siemens expressed the opinion that in populous towns the desirable area of an electric district, or one supplied from a single centre with the electric light, would not be more than a quarter of a square mile. He then figured up that the capital that would be required to light the whole of London by electricity would be $70,000,000, without any allowance for lamps or internal fittings. To extend the same system over the towns of Great Britain and Ireland would absorb a capital exceeding $320,000,000, to which would have to be added $80,000,000 for lamps and internal fittings, making a total capital of $400,000,000."

Then think of the cost of the various details of

lamps, wear and tear of machinery for generating the current; the necessity of repeated renewals of delicate parts of the various apparatus, not liable in the production and distribution of coal gas, and we believe firmly that no company with the best known appliances at present devised, will ever see a penny of dividend if competition with coal-gas be persisted in. Still the light is so beautiful and brilliant that many will, no doubt, use it for certain purposes, at two or three times the expense of gas light. These, however, are exceptions to the rule, and will form no guide in judging of the the probable displacement or supersedure of our present city gas-works.

But what we have said relates only to the processes of electric lighting as at present developed and understood. It by no means follows that this development is at an end, or that it is more than in its infancy; though we may regard gas, from the length of time it has been in use, as about at its maximum of economical production. Is it certain, for example, that we must always depend on the expensive process of generating the electric current by means of the dynamo-machine? As this process superceded the chemical battery, may not the dynamo-machine, in another decade, be as vastly outstripped by some new or improved process? As the whole earth and surrounding atmosphere are surcharged with this invisible, imponderable, incorporeal fluid, how do we know but that some new inventor may stumble upon a process of tapping this exhaustless reservoir of natural energy and light-giving power, and thus be able to draw off supplies sufficient for our wants with comparatively little or no cost? If Dr. Kavanaugh be correct in his grand supposition, that electricity is the motor-power of the solar system, it would not seem unreasonable to suppose that a small fraction of that motor-power might yet come to the aid of man without the necessity of his expending vastly more power in the consumption of coal to secure the little he gets in return. We do not throw out these hints as indicative that THE MICROCOSM has already invented and secured a patent for an improved electrical *tap*, to be applied to the reservoir of Nature, whence comes the lightning and the thunder! Hold on to your gas stocks till you see the announcement that the trial of the electrical *tap* has actually been made, and that it has proved a success. Then will be time enough to throw up your caps and sell your gas stocks for what you can get.

SPIRITUALISM.

Some months ago we called attention to this exciting question in a lengthy editorial, in which we frankly expressed our serious doubts of the genuineness of the entire so-called spiritual phenomena, now being exhibited throughout the country, such as materialization, rapping, table-tipping, slate-writing, pellet-reading, etc. We invited, as the reader remembers, any spirit-medium to come to our office and demonstrate at our table, or allow, or induce, or persuade the spirits of departed friends to demonstrate through him or her, the truth of these physical manifestations, promising, if the evidence was complete or satisfactory, to so state it in THE MICROCOSM.

We have received any number of private letters from believers in Spiritualism, berating us most unmercifully, calling us a "coward," and other pet names, because we do not ourself go to see Slade, Watkins, Phillips, and other noted mediums, and witness their demonstrations in their private apartments for the moderate fee of $3 a sitting. We don't like this word "coward," but if it must be used at all, we believe it should be applied correctly. A public journalist who can reach tens of thousands of intelligent readers, and by a scratch of his pen make a favorable or unfavorable impression with regard to the pretensions of any claimant to popular favor, is not supposed to run around the country after such claimants, in order to satisfy himself of the genuineness of their pretensions; nor is he prepared to be called a "coward" with impunity if he does not do it. If Mr. Phillips has a genuine claim to public confidence, it is but three short miles by horse-car from his private place of *seance* to this office, and if he is not afraid of his tricks of slate-writing and pellet-reading being exposed, or better, if he has no *tricks* to be exposed, it would be the biggest thing he has ever done since he commenced manipulating slate-pencils and paper-pellets, for him to come down to our office, repeating his visits until the conditions are favorable, and prove the performance to be the work of departed spirits. He would get a free advertisement that would be worth several hundred fees of $3 each, if his pretensions are genuine. We have an excellent table in our office, disconnected from all electrical wires, secret traps, or any other paraphernalia of the magician's art, so that the spirits, whether they be good or bad, may have a fair chance to demonstrate their powers on a common folding slate, which will be laid on the table, in open sight, or placed under a bushel if they prefer it. Then if one single sentence, or word, or letter, or even mark, shall be produced upon such slate without physical contact by Mr. Phillips or a confederate (which we will see to it is not permitted), he can get such a send-off as no medium has ever received in this country. People read THE MICROCOSM to learn facts, and to see truthful and rational statements concerning matters of science, philosophy and religion, and if the physical manifestations claimed by these mediums are the real work of disembodied spirits, and not

the cunningly devised tricks of prestidigitation, there is not a reader of this paper who would not be willing to know it, and to be so informed through its pages. Who then is the "coward?" Let the believers in Spiritualism, who may chance to see this offer, make a note of it, and hereafter send their amiable missives and apply their delicate epithets where they fit better than at 23 Park Row.

Since the foregoing was written, we have received the "*Western Reserve Chronicle*," published at Warren, Ohio, containing a calm but critical exposure of the tricks of Mr. Watkins, the great spirit medium, by the Rev. Mr. Kieffer, Rector of Christ's Church of that place. Mr. Watkins is the medium who convinced Rev. Joseph Cook, of Boston, of the truth of Spiritualism, and certainly ranks among the first. His *forte* seems to be in the dexterity with which he can unfold and read the writing inside of paper pellets, without detection, and the ease with which he can produce written messages from departed friends in folded slates without apparently touching them, &c. But Mr. Kieffer, it seems, after witnessing his performances in Cleveland, Ohio, invited him to his own house in Warren, prepared to carry out a plan he had arranged for detecting his *trickery*, of which he had become satisfied the entire so-called "phenomena" consisted. When Mr. Watkins, however, arrived, and had reconnoitred the situation sufficiently to see that his game was suspected, he concluded that the "conditions were not favorable," and as the Reverend gentleman expresses it, "He took his hat and the first train!" Mr. K. then goes on in answer to the inquiries of the *Chronicle* reporter, and lays open, even to the details, the manner in which the pellet-reading and slate-writing are done, and kindly invites Mr. Watkins to show, if he can, that the solution of his spirit-manifestations is not correctly stated. Now, either Mr. Watkins must publicly and flatly declare that the Rev. Mr. Kieffer's explanation is false in letter, spirit, and detail, or stand branded before the American people as a fraud. If Mr. Kieffer is right in his explanation of the manner in which the pellets, slates, and pencils are manipulated, then, clearly, every dollar received by Mr. Watkins, from relatives in search of messages from their lost loved ones, is obtained by false pretenses, and deserves the utmost penalty of the laws against swindling. Nay, more, such kinds of fraud should receive manifold severer punishment than ordinary swindling, since of all dishonesty, that which would defraud the stricken and heart-broken, under the pretense of furnishing communications from departed friends, is the meanest.

REPLY TO PROF. GOODENOW.

Elsewhere will be found Prof. Goodenow's article, containing the substance, in a condensed form, of two of his papers which he had previously sent us for publication. These were withheld partly because of their length, partly because our objections to the gravitation law were not sufficiently developed to enable him to reply understandingly, and partly for a very obvious reason, which will appear to the reader as this rejoinder proceeds.

Much in his present "Outlines of Argument," particularly concerning "Newton's Oversight," has been already replied to in our answer to Prof. Kemper's "*Christian-Standard*" article in last month's MICROCOSM, which the reader would do well to examine before reading this final rejoinder.

There are two principal divisions to Prof. Goodenow's article. One relates to the moon's fall from tangent, and its supposed analogy to a stone's accelerated rate of fall at the earth's surface; and the other deals with our charge of "oversight" against Sir Isaac Newton in framing his demonstration upon which his great reputation chiefly depends. We will examine both of these divisions, and the reader will bear in mind that for convenience we will designate the places of our quotations and comments, by referring to the numbers of his paragraphs, counting from the beginning.

The first division requires but brief discussion. We stand where we did months ago, and insist that there is no geometrical, natural, or rational analogy existing between the accelerated fall of a heavy body here and the uniform deflection of the moon from a right-line tendency. The differences between the two kinds of motion are so marked and self-evident that a child can see them. The stone falls toward the earth with an accelerated velocity increasing as the square of the time;—that is, sixteen feet the first second; forty-eight feet the the next; eighty feet the next, and so on; while the moon's deflective motion from the line of tangential force is obviously and absolutely uniform (supposing the moon's orbit a perfect circle), the same in one second as in another, and exactly double as much in two seconds as in one. Hence the beginner in natural philosophy ought to see that no *acceleration* can enter into the moon's motion, but that its velocity both forward along its orbital path, and deflective from the line of tangential force, must be constantly the same. Indeed, Prof. Goodenow has frequently admitted in previous articles that the moon has no acceleration in its *motion* either forward or deflective, though he claims that it has the appearance of acceleration in its departure from a fixed tangent. This he calls an "exact equivalent" of acceleration! But how can it be an *equivalent* of accelerated motion when this appearance results from the mere accident of a straight line arbitrarily drawn and maintained while the moon proceeds steadily on in its circle with absolutely uniform speed? As well argue that Dexter, in trotting at uniform speed

around a circular race-track, enclosed by a four-square fence, produces a result the "exact equivalent" of accelerated velocity, beeause his distance increases with augmented rapidity from one side of the fence! Any jockey that ever rode a race would be able to laugh such philosophy out of countenance, and show that the mere accident of this tangential fence and the horse's rapidly increasing distance from it, when passing the centre of one of the squares, was no more the "equivalent" of an accelerating gait, than would be the rapidly increasing length of the horse's shadow as it passes away from a lamp post! Yet we are constantly obliged to argue with eminent astronomers to point out the absurdity of this claim to equivalence on which Newton's greatest demonstration is based.

But the most marked evidence of the want of all true analogy in the two kinds of motion, is the undeniable fact that the deflection of the moon from the constantly shifting line of tangential force is the result of *gravity alone*, as there is nothing else for it to be, while the velocity of a falling stone is confessedly not the one ten-thousandth part the result of gravity alone, nearly all of the distance traveled being the effect of accumulated velocity! This latter position Prof. Goodenow has admitted unequivocally in previous articles published in THE MICROCOSM.

To end this part of the controversy, however, we have only to summon Prof. Goodenow himself to the witness-stand. What did he say about Newton's great demonstration and his measurement of this very fall from the tangent, in which that eminent philosopher proved that the two kinds of fall corresponded precisely during one second, not even lacking the 30th of an inch? Why, he tells us in the August MICRCCOSM that Newton's "measurement perpendicularly downward" from the tangent was "only *roughly used as sufficiently accurate for a short distance from the starting tangent*"! This he repeats in various forms, and says on the same page that the fall of the moon from the tangent is "*rudely shown by this rough measurement!*" Yet this very "rude" and "rough measurement" of Newton, confessed to be such by his most ardent disciple and advocate, is the actual demonstration which immortalized that renowned philosopher. And because we have the hardihood to doubt the infallibility of the author of such a "rude" and "rough measurement," claimed by him and his followers to be a "mathematical demonstration," we are regarded as almost guilty of philosophical sacrilege.

Let us, as an illustration, look at the scientific accuracy of Prof. Goodenow's statement of the second law of motion in the 5th paragraph. He says: "The whole *motion* coming legitimately from any acting force is virtually maintained in *its own proper direction*, however combined in composition with other *forces* and *motions*, as the resultant of them all." Now, this statement, covered up and confused as it is, contains a positive fallacy. The "proper direction" of the force of the earth's gravity is toward the earth's centre, and nowhere else; but is this "motion" maintained in a stone when it is thrown by mechanical energy perpendicularly or diagonally upward? By no means. This "motion" of the stone absolutely counteracts and destroys the "motion" of gravity, though the *force* of gravity is acting all the time, and hence is not lost or destroyed. Surely the "motion" of the stone cannot be downward and upward at the same time, which Prof. Goodenow unequivocally teaches, if his words have any meaning. Of course, his object in such a statement is very plain. It is to prove that no part of a stone's accelerated fall is counteracted by *horizontal* projection. But if it is all counteracted by upward, or even partially upward, projection, as shown, may not a part of it be legitimately counteracted by horizontal projection, and more and more as projection increases in velocity? We proved beyond all cavel that horizontal projection tends absolutely to destroy downward acceleration in exact proportion to the velocity of projection. For example, a cannon-ball dropped perpendicularly from the top of a tower 1,024 feet high, would reach the sea-level in eight seconds. If fired horizontally (the air being out of the way), with force sufficient to carry it entirely around the earth before it would reach the sea-level, such projection would distribute this accelerated fall throughout more than an hour instead of eight seconds; and if the projection were augmented sufficiently to counterbalance the pull of gravity, the ball would never reach the sea-level, but would continue in a circular orbit about the earth, and consequently *all the acceleration of fall would be annihilated*, though none of the force of gravity would be destroyed. In such event, *gravity alone* would cause the entire deflection from the tangential line of projectile force, leaving no analogy whatever between such deflection and a direct fall, in which unaided gravity causes but a small fraction of the velocity. Let this suffice.

We now come to the most important part of Prof. Goodenow's article—his attempted answer to our charge of "oversight" on the part of Sir Isaac Newton. And we now express our conviction that the Professor does not really know what view he holds in regard to the matter,—that he totally ignores and denies the philosophical principle of *reaction*, as applied to the force of attraction between bodies,—and that he flatly contradicts himself in his two different articles upon this very subject, one being sent to us immediately after our charge of "oversight" appeared in the

October number, in which he distinctly admits *reaction*, and the other, as printed in this number, which grew directly out of our startling proofs from the "*Principia*," quoted in the December number, and in which he as distinctly denies it. In those extracts from the "*Principia*" we showed that Newton denied that any portion of the moon's fall from the tangent was caused by its own attraction of the earth *one-eightieth* as much as the earth attracts it. We showed further that Newton afterward explicitly explained his demonstration by telling us that a pebble and the moon let fall from equal heights (without any other motion), would fall *with the same velocity toward the earth*, thus teaching that the moon no more adds to its own rate of fall in consequence of its mass or self-pull than would a pebble.

After these quotations from the "*Principia*" had reached Prof. Goodenow, he saw that his previous article (in which he had severely sensured us for misrepresenting Newton) was all wrong, and that he had involved himself in a serious difficulty; hence he wrote us, requesting that we return his article for modification, as he was not aware, when he wrote it, of the line of proof we would adopt from Newton's "*Principia*"! This request we, of course, declined to grant, as we knew positively that the professor would be forced to contradict his previous article if he should attempt to agree with Newton in regard to the equal fall of all bodies, whatever their difference in mass. As we would not return his article, he had to take his choice, and he therefore decided to cast his lot with Newton and with the science of the whole world, namely, that a feather and a cannon-ball *in vacuo* must, and actually do fall with precisely the same velocity. And hence that the moon and a pebble would fall with the same velocity, just as Newton teaches. Consequently he says (12th paragraph): "*The moon's mass does not affect its own rate of fall from the tangent. Yet it does give motion to the earth*, thus adding to the total gravital velocity of *mutual approach*," etc., a thing not in controversy at all, but just exactly what we said in our October article, that Newton and all astronomers taught, and for which Prof. Goodenow condemned us in the severest manner, saying that we had made ourself "ridiculous," etc.! To assure the reader that there is no mistake in this, we here quote our own exact language from the original charge of "oversight" in the October MICROCOSM, which, as we will soon see, Prof. Goodenow condemned. We quote from pages 88, 89:

"While Newton recognized the earth's attraction of the moon, *by which it is pulled from its tangent a certain distance in a given time*, and also recognized the moon's attraction of the earth, *by which the latter is also pulled out of its position to a certain extent toward the moon, he wholly overlooked the fact that the moon also pulls itself a considerable distance toward the earth by its own independent attraction of our planet!* For example, the moon being *one-eightieth* (in round numbers) the mass or weight of the earth, it must pull upon the earth, and thus *pull itself toward the earth* with *one-eightieth* as much force as the earth pulls it; and, consequently, while the earth is pulling the moon 80 miles, for instance, from a fixed tangent, the moon is actually pulling itself *one mile* in the same direction by its own attraction of the earth. * * * 'Tis true, Newton all through the *Principia* speaks of the reciprocal attraction of spheres, meaning thereby that the earth, for example, attracts the moon, while in turn the moon attracts the earth, each in the ratio of its mass; but he never intimates the fact here pointed out, *that each also attracts or pulls itself toward the other as well as the other toward itself*—and each in the *ratio of its mass.*"

Now, reader, here is exactly what we said that Newton taught and recognized—the very thing which Prof. Goodenow (paragraph 12) now says he does teach and recognize; and here also is exactly what we said that Newton overlooked or omitted, which Prof. Goodenow now says he was right in omitting, but for which, in his former article and letter, he severely censured us, or else there is no meaning in words! How strange that we should have been reprimanded for charging Newton with teaching reciprocal attraction just as Prof. Goodenow now says he did teach it; and how very funny that we should then be accused of making ourself "ridiculous" for charging Newton with omitting the very thing which Prof. Goodenow now says Newton did omit and was right in so doing! Plainly this is no exaggeration, for in the present article the moon does not displace itself at all by pulling at the earth, neither does the earth displace itself by pulling at the moon, though each displaces the other by reciprocal attraction, the very thing we said that Newton taught!

But is it true that Prof. Goodenow, on first seeing our October article, reproved us for falsely charging Newton and the astronomers; and is it true that he then understood the doctrine of reciprocal attraction and of reactional displacement of the moon by its attraction of the earth just as we did? We assert that it is true, and we will demonstrate that Prof. Goodenow then agreed with us, and absolutely thought that Newton and the astronomers taught the same thing, and consequently that they had been grossly misrepresented by us. First we received a private letter, which we will show to anyone desiring to see it, and which we now claim the right to quote:

"BATTLE CREEK, IOWA, Oct. 11th, 1882.

"Mr. HALL: *My Dear Sir:*—

"How could you put forth what you have in the October MICROCOSM? How could you publish (reiterating again and again) that Newton and all the astronomers have neglected to make allowance for the moon's mass or attraction in reckoning the *fall from its tangent*, and so have lost *one-eightieth* part of the value; *when that very allow-*

ance is one of the most prominent features of Newton and of every text-book upon the subject! All writers expressly reckon what the value of *divergence from tangent* [not weight or *momentum* of course] *would be if the moon were a point without mass*, and then proceed at once to demonstrate what it actually is *by reason of the additional mass or attraction of the moon*. They thus add one-seventy-fifth (not one eightieth) *to the gravital effect at the moon* [meaning "divergence" of course, not *momentum*] *in addition to what the earth's attraction alone produces!* This is so plain on the face of every text-book published—how could you *so falsify the facts of the case and make yourself ridiculous*, as you have, *in that long splurge* of October, over an entire mistake of your own?" (Signed) S. B. GOODENOW.

Yet, gentle reader, this terrible arraignment has all exploded and is now abandoned, without even an apology; and a wordy but obscure confession of absolute mistake has been substituted, as printed in this number, without the frankness to say so plainly! Everything we charged Newton with omitting he now says Newton did omit (that is, the *self-displacement* of the moon), and that he was correct in doing it! Every thing that we said Newton taught or meant by reciprocal attraction he now admits to have been stated correctly, though we had *falsified* the facts and made ourself *ridiculous* by stating the absolute truth as to Newton's teaching, as well as to what he omitted to teach!

But Prof. Goodenow, in his article which reached us directly on the heels of this raking private letter, is still more explicit in his agreement with our view (that the moon does actually fall in proportion to mass by its self-attraction of the earth) and in maintaining that Newton and all the astronomers taught the same thing, and consequently that we had mistakenly charged them with omitting what was clearly taught on the face of every text-book. In that article he goes into careful detail to show that they all recognized this *one-eightieth* of the moon's fall in proportion to mass, in addition to its rate of fall caused by the earth's attraction, and thus tries to impress upon us the enormity of our mistake in so falsely charging them with overlooking it! Reader, this looks like a romance, but it is every word literally true, as our extracts from that article will abundantly demonstrate. Here is a specimen:

"Take the case as given by Wilford. Suppose one boat to be eighty times the weight of the other; then it will take only one-eightieth of the *motion* [not *momentum*, remember] which the other boat takes [supposing, of course, all friction out of the way]. If, therefore, a strain be applied from the large boat, pulling the small boat eighty feet [this is not *momentum*, but *distance* or *velocity*], *that same strain must have moved the large boat itself one-eightieth part as much, or one foot; making the boat's eighty-one feet nearer than before*, of which the larger boat has moved one-eighty-first and the smaller boat eighty-eighty-firsts, or eighty times as much. [How plain and true!] If at the same time a strain be applied from the small boat in proportion to its weight [that is the moon], namely, one-eightieth part as great as the other strain, *it will move each boat one-eightieth as much as the other strain*, namely, the small boat, one-eightieth part of eighty feet, or *one* foot [this is not *momentum but velocity*], and the large boat one-eightieth part of one foot, or one-eightieth foot!"

How clearly and concisely can Prof. Goodenow express himself when he has truth and self-evident science on his side! And how foggy the effort becomes when he is forced to take it all back in order to agree with Newton's erroneous position in regard to the equal velocity of all falling bodies, as we see in the present article!

But does this boat-illustration (so clearly in accordance with our view and what he then thought to be Newton's view) apply to all other bodies free to move, including spheres? Prof. Goodenow shall answer. Immediately following the last quotation he goes on to say:

"In short, in *every case* of bodies thus free to *move toward each other*, with proportional drawing ing force between them, *the drawing force from each body is not all spent in drawing the other body, but is partly consumed in reaction or in shoving itself toward the other body!*"

None of your "*peculiar* nature of gravity" or side-issue about "momentum" here, but a square out-and-out statement of the third law of motion with its *action* and *reaction* included, which he naturally supposed Newton to teach! But how flatly this contradicts his present article, in which the entire motion of the moon by reaction in proportion to mass is denied! (See paragraph 12).

In the present article the professor repeats it in various forms that the only *motion* produced by the moon's attraction of the earth is in drawing the earth slightly nearer to it, and that the moon does not, by the *reaction* of its pull displace itself at all; and that the earth, in pulling the moon, does not displace itself by *reaction*, but only increases the earth's *momentum*. This view the professor was forced to adopt in order to keep company with Newton; for if the earth displaces itself by *reaction* at all, in pulling the moon out of its place, it must shove itself a distance proportioned to the mass of the moon—that is one-eightieth the distance that it pulls the moon. And, therefore, according to the boat-illustration, the moon must also, by *reaction*, shove itself toward the earth a distance proportioned to mass—that is one-eightieth as much as the earth pulls it. Hence it follows that a falling stone a *millionth* part of the earth's mass displaces or *shoves* itself by *reaction* only *one-millionth* as much as the earth's attraction draws it! Consequently the professor was right in his first article and wrong in his second, and hence Newton is also wrong, as the moon must fall faster than the stone by the exact amount of its own additional reacting *shove* of

itself. This view was emphasized by Prof. Goodenow so clearly in the boat-illustration just quoted, that it is a reflection upon the reader to elaborate it. But, as before remarked, our proofs from the "*Principia*" opened his eyes, and forced a change of front, or else an unconditional surrender to our charge of "oversight"—a confession that Newton was wrong, and that all science was in error in teaching that a feather and a cannon ball *in vacuo* would fall with the same velocity. Hence the professor, without any such candid confession of his errors, goes to work quietly in his present article, discards all he had before admitted about reacting *shove* of the moon by its pull at the earth, converts all this reactive *motion and velocity* into "*momentum*," and leaves the reader to think that he had been entirely consistent throughout, and that mathematical astronomy was so settled that it needed no trimming of sails to steer clear of breakers. But a more glaring self-contradiction of fundamental principles than that between his first and second articles does not occur in print. If any other proof were wanted, here is another brief extract from his previous article (which anyone is at liberty to examine), in which the actual effects of *reactive motion*, by the reciprocal attraction of earth and moon, are correctly and concisely described. He says:

"While the earth draws the moon eighty feet, *it pulls itself toward the moon one-eightieth part as much, or one foot, just as Wilford says.* But meanwhile, how much does the moon draw the earth toward itself? Instead of drawing it just as much, we have shown that its attraction being only one-eightieth as much, and exerted upon eighty times as much mass, *it moves the moon itself (by reaction) but one foot, and moves the earth with its eighty-fold mass by direct action but one-eightieth of one foot*"!

Not a word here about "momentum"; but the whole "reaction" of the moon's gravital effect, in *shoving* it toward the earth, is "*just as Wilford says*," namely, "*motion, velocity, distance*, "one-foot," travel, while the earth pulls it "eighty feet"! But now it comes to pass that all this "reaction" is changed from velocity, motion, or distance of travel, to "momentum," as the effect not of reciprocal attraction, but evidently of those surprising quotations from the *Principia!*

Now, had the professor frankly and candidly acknowledged in his present article that he had been mistaken, and had he apologized for reprimanding us so severely for falsifying Newton, when we had only stated the exact truth in regard to his teaching, we would have forgiven him all bygones, and not so pointedly inflicted these disastrous self-contradictions.

The reader can now understand why the professor wished us to send back his first article on "Newton's Oversight" for revision, or, more probably, for the *stove!* He can also guess why we did not send it back, nor print it till we had the professor's reply to our quotations from the *Principia!* We knew positively that he would be forced either flatly to contradict himself, or else to abandon Newton. He has chosen the former (without an acknowledgment of his mistake), and prefers to cast his lot with Newton and with the science of the world. But we leave the intelligent reader to judge which is the more reasonable and philosophical view—the labored and obscure mixing up of things in the present article, or the clear, self-evident principles of science enunciated in the three quotations we have made from his first article, which he declares to be "just as Wilford says."

But the professor not only contradicts himself, but he is in direct conflict with Prof. Kemper, whom he has commended as good authority. See our extract from Prof. Kemper's *Standard* article, in last month's MICROCOSM, in which he says, in speaking of the moon's pull of itself from the tangent in proportion to mass:—

"The *effect is the same* as if we conceive the moon to be deprived of this reciprocal attraction, and instead thereof a mass equal to the moon to be added to the earth, for it is obvious that this mass, being, as Wilford says, *one-eightieth* of the earth, *the additional attraction upon the moon will be equivalent to what he claims for the moon's attraction of itself.*"

This is undoubtedly correct, and agrees exactly with the extracts just made from Prof. Goodenow's former article written evidently before he was aware of what Newton had taught. Plainly, Prof. Kemper states the true principle of philosophy, though he unfortunately contradicts it immediately after. All men agree that if the earth's mass were increased one-eightieth, it would cause the moon, deprived of reciprocal attraction, to fall one-eightieth faster. If the earth were doubled in mass, it is equally plain that such a moon would fall with double the velocity that the present earth causes, and if, instead of doubling the mass of the earth, the moon were to be increased to the same mass as this earth, it is plain that each would attract the other with equal force and velocity, while each would also, by reaction, attract itself toward the other with exactly the same force and velocity that it would attract the other toward itself, thus quadrupling their velocity of approach over the fall of a pebble deprived of reciprocal attraction. This is distinctly taught in our last extract from Prof. Goodenow's letter; for he there says that while the earth (eighty times the moon's mass) pulls the moon eighty feet, it shoves itself one foot toward the moon by reaction, making eighty-one feet of mutual approach; and in the meantime while the moon by *reaction* shoves itself toward the earth, 1 foot, it pulls the earth by direct attraction one-eightieth foot, making the entire mutual approach eighty-two and one-eighti-

eth feet! Can anything be plainer? Hence, "just as Wilford says," the moon let fall toward the earth would add to the earth's pull in velocity or distance traveled one-eightieth over and above the fall of a material point without mass. Hence, again, Newton and the science of the whole world are wrong.

As evidence that the professor felt the situation, and knew he was taking back all he had said in his first article, he is constantly speaking of the "*peculiar* nature of gravity," repeating it no less than four or five times in his present article. We admit that a gravity which could turn such a summersault in the space of two months must be "peculiar." Two months ago it produced *reaction* as well as action—in *feet, motion, velocity*, and that too in exact proportion to the masses of the attracting bodies. Now it has become so "peculiar" that it produces no velocity or motion at all by *reaction*, but simply *static momentum*, which is nothing but weight. Very "peculiar"!

But, seriously, what was this long and critical discussion of *momentum* (consuming six or seven paragraphs, 21 to 26) introduced for? There is and can be no controversy between us on that subject, as a child ten years old, even if he has never been to school a day, knows that a pith-ball fired from a gun, might strike a man and not hurt him, while a leaden bullet striking him with the same velocity, would go through him and kill him. The whole difference consists in the difference of the *momentum* of the two balls. What, then, was the object of this long discussion of a side-issue upon which we have no controversy? We can think of nothing so much as the military ruse of raising a rattle of musketry on the flank of a victorious enemy to cover a demoralized retreat!

If the reader wishes to see a rare specimen of philosophical incoherency, let him take his pencil and number the paragraphs of the professor's article on the margin, from 1 to 34, and then read carefully numbers 12, 21, 30, and 31, comparing each with the boat-illustration; and the last quotation from his first article, and he will wonder what sort of trash mathematical and astronomical science is made of. How, for example, as a single illustration, can the moon's "pull of itself" cause "*one-half of its motion*, as astronomers teach" (31), and still cause but one-eightieth of its motion, as in our last extract from his former article? How can "*just half* the moon's *gravital motion*" be "due to reaction, or pull of itself, in every case, and the same in regard to the earth," (30) and none of it be due to reaction (12)? And at the same time how can it be that "the falling velocity of a body does not depend at all upon its mass, and the moon's mass cannot affect its own rate of fall;" (21) and the boat-illustration have any sense? In a word, how can the moon fall "just as Wilford says," and these incoherent statements be all true, just as Prof. Goodenow says?

But does Prof. Goodenow really and sincerely believe with Newton, and astronomers, that the moon and a pebble would fall with the same velocity, after so emphatically agreeing with "Wilford" that the velocity or distance of fall would be according to mass; and after illustrating it so clearly by *action* and *reaction* himself? We aver that he is anything but clear or strong in his own mind on the subject, or he would not employ so many "ifs" in speaking of this "peculiar" action of gravity. Note his hesitancy in paragraph 29:

"Now *if* they [Newton and astronomers] are right in treating gravity as *peculiar*, and *velocity of fall as equal for all masses*," etc. Again; four lines further on,—as if his mind were whirling with doubts: "But *if* they [Newton and astronomers] *should even be found wrong as to the equal velocity of all falling bodies*," etc!

Yes, professor your "ifs" are well-timed, for you can depend upon it "they" will not only be "found wrong," but they have already been found wrong by your own clear and irrefutable arguments in your other article, as we have here quoted; and we firmly believe that you will regret the hour when you decided to abandon that beautiful and consistent view of philosophy to cast your fortunes with the *Principia*.

RECEPTION OF THE MICROCOSM.

We do not deny a feeling of pride at knowing, as we do by constant reminders, the enthusiasm with which this magazine is greeted by our subscribers. We have hundreds of letters—sufficient to fill several large volumes—filed away and recently received, which all breathe the same joyous spirit at the work we are doing. We have tried to imagine the editor of the New York *Independent* pouring over these files from his "*ignorami*" for a couple of hours, and to guess his facial expressions as he reads the words of joy, and thanksgiving, and prayer, and amazement, from sincere ministers of different denominations and learned professors of science from different colleges! Wish he could see them. We have only room for one of these kind epistles, which must be taken as a specimen sheaf from a hundred acres of golden wheat:

MINDEN, MICH., Jan. 19.

A. WILFORD HALL:—

Dear Sir: As one of your numerous subscribers, I must express the intense interest I feel in the perusal of THE MICROCOSM. The reading of each number only creates an insatiate thirst for the next. You have filled a vacuum in the journalistic world that has long been felt, especially upon religio-scientific subjects; and many a poor thirsting mortal, with parched lips, is now quaffing the waters of this life-giving fountain, and receiving spiritual strength therefrom. I am one of them. The new doctrine of *Substantialism* is destined to work a great change in our scientific and philosophical modes of thinking. Your "*Problem of Human Life*," as the precurser of THE MICROCOSM, is performing a mighty work to

the same end, and the two are auxiliary to each other. I have also been vastly amused at the manner in which you overturn your critics; and have laughed immoderately at the absurd picture of their helplessness as one after another is borne down by his own self-contradictions. Go on, most noble worker, in your grand and glorious mission of conquest for the cause of true philosophy, and may you cease not till every temple dedicated to science, "falsely so-called," shall totter and fall. Yours most truly,

W. A. BADEAU.

THE NEW CHURCH QUARTERLY REVIEW.

This new Quarterly of the *New Church*, or Sweedenborgian denomination, has signalized its fourth issue (for January) by a daring attack upon the new departure on Sound, as discussed in the "*Problem of Human Life.*" The venturesome assailant is Prof. Thomas French, Jr., Ph. D., Professor of Physics in Urbana University, Ohio. This long looked-for attack had been considerably heralded, as we have received a number of letters from different States warning us of the impending storm. The cloud, which has, apparently, been gathering for nine months, burst upon 23 Park Row as we were about going to press, of course too late to be described in this number of THE MICROCOSM, and consequently we shall be obliged to postpone it till next month. Our readers will naturally expect something highly important when they are informed that of the fifty-three pages of this Quarterly devoted to regular papers, twenty-six pages, or almost one-half of the entire magazine, is occupied by Prof. French in his endeavor to weaken the force of our assault upon the wave-theory of sound! This shows in advance the importance that professors of physics are beginning to attach, *pro* and *con*, to that treatise. But wait patiently for our reply, and if enough of Prof. French and his learned criticisms can be found intact to make a respectable shadow, then the few New Church people who read that Review can mark us down as a ninny of the first water. The professor himself has positively annihilated and abandoned the wave-theory in attempting to defend it. But of course he does not know it. Wait.

THE REFORMED QUARTERLY REVIEW.

This strong Quarterly, in marked contrast with the foregoing, prints an able and scholarly paper by the Rev. Dr. Graeff on the "Central Issues of Modern Criticism," in which several kind allusions are made to our work. The writer concludes his paper by the following handsome acknowledgement:

"The famous book of A. Wilford Hall—'*Problem of Human Life Here and Hereafter*'—has already been reviewed in this *Quarterly*, and it needs not to be again introduced in that way at this time. Still it is due to the author to state that the arguments in favor of entitative biological thinking presented in this article have been suggested by his exceedingly interesting book. This much I feel constrained to say, in the way of literary courtesy, and also to encourage the development of a species of scientific criticism that will correct the fallacies of modern science, and give us a new era of genuine practical humanitarian philosophy. Certainly, it is time that secular science and Biblical theology should discover their true kinship, and take each other cordially by the hand in solving the destiny of man. Mr. Hall seems to be not only an honest co-worker, but his critical ability and scholarship cannot fail to make a profound and lasting impression. Live thinkers, free from all motives of prejudice, will not refuse to give the products of his mind a fair and generous consideration."

AN EDITOR'S OPINION.

WILFORD'S MICROCOSM for January is received. This little world of mind puts no straight-jacket upon its contributors who speak for the truth. Hence it contains such evidence as each one finds in Scripture or Nature favorable to his belief or theory. And if anyone advances a doctrine or theory which another cannot accept, that other is apt to furnish a statement of his belief for the next issue. And the great mind of the editor acts as a balance to keep the whole machinery at a regular, or at least at a safe speed. Its articles are all by actual contributors, or by the editor. This magazine cannot be too highly recommended to those who earnestly desire to obtain a clear, full, and correct knowledge of God, the inner man, of will and mind, and of Nature. It costs but $1.00 a year.—*Mt. Joy (Pa.) Herald.*

MORE DESTRUCTIVE SOUNDS!

It is somewhat remarkable how much damage is being done by intense *Sounds*, according to the wave-theory. In Holland, recently, there was sent off a terrific "sound-pulse" by an exploding magazine, which unroofed nearly all the houses in the village near where it occurred; and in California an explosion of giant-powder has occurred, which sent off such an intense *noise* that for half a mile in all directions every building was shattered, and many people were disintegrated and scattered in all directions by the loudness of the *sonorous wave!* How do scientists like this kind of acoustical description of magazine explosions? Like or dislike it, they are forced to take it all in till they will consent to a revision of their text-books on physical science; for this is almost verbatim the language of Prof. Tyndall in his work on Sound (page 23), used as a standard text-book in all our colleges and universities. Not until professors of physics are able to distinguish between the compressed air-wave caused by the sudden addition of powder-gas, which does all the damage, and the sound-pulse, which does no damage at all, and thus abandon the wave-theory, will they be able to make acoustical science appear reasonable to students who exercise any degree of judgment in their studies.

WILFORD'S MICROCOSM.

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IS MAN'S PHYSICAL NATURE AN EVOLUTION FROM THE LOWER ANIMALS? No. 3.

BY REV. JOS. S. VAN DYKE.

Another difficulty, How shall we account for the fact that from an indefinite number of variations, minute and ill-defined in all conceivable directions, and having a natural tendency to destroy one another, certain changes should become so well established as to remain permanent marks of an entirely new species? Can it be proved that the advances of the gorilla-tribe, if advance has occurred, have proceeded to the extent of developing a new species—man? The chances are almost infinite in number against the appearance even in one pair of monkeys through numberless generations, of organs, faculties, senses, perceptions, and moral qualities, useless for the time being in the struggle for life, and yet converging to the same point—the evolution of a human being. Add to this the fact that there are a thousand chances to one that if a new species is produced it will speedily revert to ancestral forms, or, if slight increments of change acquire such permanency that it will be followed by the production of other closely allied species, and we are enabled to catch a glimpse of the improbability of this theory, an improbability amounting almost to demonstrating that no species of ape could have been man's progenitor.

Even supposing that all these fortuitous variations were improved types, still some would improve more than others; hence it must result that this ascending series of necessity would have perpetuated branches of the similar family in advance of previous forms, thus producing a graduated series between man and his ape-like ancestors. No such gradation of beings exists, or has ever existed, so far as known. And if one species of the ape family had actually advanced a few steps towards manhood, the powerful tendency to revert to the original type would, in all probability, have obliterated the slight improvement long ere the immense intervening distance was successfully traversed. The variations, all within narrow limits, which man has been able to produce in animals by the careful selection of individuals possessing transmissible qualities, are very speedily obliterated when care is relaxed, the old types reappearing.

Admitting that Natural Selection does tend to produce variation, and that it accumulates and preserves these slight increments of development; still, can it evolve higher species from lower? This, confessedly, has not been proved. It has been proved that rudimentary organs exist, that new varieties can be produced, but it has not been proved that advance is indefinite, nor that when it occurs it is not a regain of lost characters. Ducks, removed for several generations from water, are said to lose the web from between their toes; placed again for several successive generations near water, they redevelop them. Does this prove advance? If a few pairs of monkeys, more ambitious than their neighbors, should acquire greater facility in the use of their fore-feet as hands, and should assume a more erect posture, and under the operation of natural selection should be capable of preserving and transmitting these acquisitions, it would yet remain to prove that these changes were not a reversion. Even then the problem would not be solved, for it would still be necessary to show that the improvements actually continued till "the human form divine" was evolved from that of the ape, and then acquired such fixedness as neither to advance further for thirty thousand years, nor to revert in one single instance to the ancestral form.

If man is descended from some ape-like progenitor, it is quite difficult to see why his infant children should have become so helpless as to require years to attain strength and knowledge sufficient to take care of themselves. The human infant is the most heipless of creatures. Young monkeys are sprightly, active, and self-helpful.

It ought to be observed, moreover, that the gain of a few individuals is not a net gain to the species; and in Nature, where "love" has her own wild way, what is to prevent such a pairing of individuals as shall effectually obliterate these slight improvements? Manifestly there is an almost absolute certainty that the advance made by the few will, in a state of Nature, speedily disappear under the malign influence of the many. If there is any permanent improvement, it must be, quite manifestly, the gradual improvement of the entire species, at least of all the individuals inhabiting an extended region; but how is this possible without leaving monuments along the lengthened pathway through which they must have journeyed?

HAS A WRONG RELIGIOUS BELIEF A DEMORALIZING TENDENCY AND INFLUENCE?

BY REV. T. WILLISTON, M. A.

Every man, however irreligious he may be, has a religious belief of some kind; the deist or the atheist as truly as the Christian; the man that has no guide but reason, conscience, and the book of Nature, as truly as a man that has grown up in a Christian land. And the question before us is virtually this: Are all religious beliefs equally good in their tendency and effects? Or have some of these beliefs a demoralizing influence, a direct tendency to vitiate the morals of those that entertain them? Let us examine a few of the false beliefs that have prevailed, and inquire what their legitimate influence has been and is. Here, for one example, is an avowed atheist. He believes in no personal God, no moral Sovereign, no all-searching Mind that discerns all hearts and all actions, and that will one day "bring every work into judgment with every secret thing, whether it be good or evil." For him there is no hereafter, either of blessedness or misery, and blank annihilation is all that is in reserve for him when he dies. Now the question is not whether this atheist *may not*, for reputation's sake, or for other reasons, be a moral and trustworthy man; but whether he is *as likely* to be such, as if he believed in a God and in future retribution. Is there the same *probability* of his being honest and veracious, as there would be if the words "Thou God seest me" constituted

a part of his belief? There is not. It is admitted that from lower motives an atheist may be a man of reputable morals and upright life, but if he is, no thanks are due to his atheistic belief. The direct tendency of *that* is to make him a sensualist or a knave. And what is here said of atheism and its adherents may safely be said of those who, professing to believe there is a God, either deny the Bible to be an inspired book, or acknowledge it as inspired, but wrest or reject some of its fundamental truths and teachings. Merely believing that there is a Supreme Being, or that there is a future state of existence for man, was not all that we mortals needed; else a revelation from Heaven had been unnecessary, and the Bible had been a superfluous gift. We needed a clearer light on such great themes as God's character and man's immortality than that afforded us by Nature and Reason; and in the Holy Scriptures we have that clearer and much needed light. There is such a thing, however, as one's professing to believe the Scriptures to be inspired oracles, and yet *wresting* them—making them teach the opposite of what they in reality *do* teach. (2 Pet. iii: 16). Now here are three men that profess some respect for the Bible, but that, as we think, grossly misinterpret the Book in some important particulars, or rather are guilty of doing what is so pointedly condemned in Rev. xxii:18-19. The first of the three believes that for those who persist in a wicked life until they die, no other punishment—if punishment it may be properly called—is in reserve than non-existence. He thinks that if he chooses to lead a pious life he will have a happy hereafter, but that if he prefers a wicked life to a pious one, he will have *no* hereafter—will simply cease to exist. The second man believes that he is to exist forever, but thinks that if, while here, he should neglect the "great salvation," an opportunity to repent and be saved will be granted him in the coming world. The third of these self-deluded men advances a step beyond the last named, in that *he* believes not only that the wicked will have a *post mortem opportunity* to be saved, but that they *all will be saved*. It is this man's belief that, no matter how wicked a life he may have lived, no matter what awful crimes he may have perpetrated, "The wrath to come" (if there be any "wrath to come") will exert a melting, subduing, purifying, and transforming influence on him. When, therefore, punishment has wrought this marvelous change in him and his fellow-prisoners, and when by repentance and suffering they have fully atoned for their crimes, he thinks they will all be released from prison and made the inmates of heaven. Have the beliefs of these three men a tendency to render those that believe thus honest, truthful, and unselfish, or is their tendency the very opposite of this? Knowing as we do how often crimes either go undetected, or else go unpunished by any human authorities, something more is needed for the safety of society and the prevention of crime than human tribunals, and the fear of human retribution. In so depraved a world as ours, if evil-minded men and *would-be* criminals were wholly free from the fear of punishment; if they thought they could escape being arraigned before human tribunals, and if they believed in no hereafter for mankind, or in non-existence for those that die in their sins, or believed in only a *limited* punishment in the world to come, would they not be far more likely to indulge in all manner of crimes than if their beliefs were scriptural? Is it not quite certain that they would? O, if all *would-be* libertines, thieves, burglars, murderers, and criminals of every sort, could but be free from all fear of punishment, either here or hereafter, our world would be far more wicked and unendurable than it is—would be almost a hell! If it is of no consequence what a man's religious belief is, or if an unscriptural belief has no vitiating influence on one's morals, how came we to have the custom of requiring witnesses, with hand on the Bible and with a solemn appeal to God, to swear that, in the testimony they are about to give, they "will tell the truth, the whole truth, and nothing but the truth?" What is the significance of this judicial oath, ending with the prayer, "So help me God?" Why, the practice of administering that oath is a virtual declaration of the civilized world, that nothing is so suited to solemnize a witness and render him veracious, as his believing in a future state, and in an avenging God. He who takes that oath does in effect pray, that if his testimony is false the curse of God may overtake him. And the legitimate inference is, that to render one's promise or testimony strictly reliable, he should firmly believe in future retribution.

Having seen what reason's verdict on this point is, and what the judicial oath proves the world's opinion to be, what, we now ask, is the testimony of facts? We will first appeal, for confirmation of the foregoing views, to the corrupting influence of infidelity on the morals of France during the latter part of the last century. It is well known that before and after the bloody French Revolution, an awfully corrupt state of morals prevailed in France and some other parts of Europe. Vice and crime then wore an unblushing front, and a shameless immorality pervaded nearly all ranks. The French nation was steeped in iniquity and moral filth. Now what, more than aught else, was the generating cause of this prevailing corruption? Was it not largely ascribable to the anti-christian, atheistic writings and efforts of such infidels as Voltaire, Rousseau, Diderot, D'Alembert, Holbach, Weishaupt, and others? It is a matter of history that at that period infidel books and tracts were scattered *broadcast* throughout France and other countries, and that atheism had the control of the press in France, and the control also of the education of youth. To this day France has not fully recovered from the demoralizing influence of the infidel sentiments that were so industriously and so widely circulated by Voltaire and his associates. Indeed it may safely be affirmed that wherever atheism or deism prevails, be it in communities or in individuals, there a very lax morality may be expected to prevail. Not more natural and certain is the connection between putrid substances and impure air, than is the connection subsisting between a skeptical belief and immoral conduct. They belong together, and it is an exceptional thing to find them disjoined. Had the religious opinions of Thomas Paine nothing to do with the inebriety and other vices that disgraced the latter part of that deist's career? Would Rousseau have been the sensualist that he was, had he not been a skeptic? Is it not certain that an anti-scriptural belief has a vitiating tendency? Granted that he who ridicules the Bible and sneers at all sacred things *may* be, and occasionally *is*, a man of reputable life and morals: is he *as likely* to be such as though his belief was based on the Bible? Facts without number prove that he is not.

If, then, a right religious belief is so very important, and if there is so close a connection between one's creed and his morals, it was obviously of the highest importance that men should have an unerring *standard of faith*—a moral criterion

by which to try their varying beliefs, and ascertain their soundness or unsoundness. If tests were needed to try silver and gold by, or to measure the weight of the air, the quality of milk, the degree of heat or cold, and various other things, much more was a standard needed in morals and religion. Such a standard we have in that incomparable book, the Bible. In the department of morals and religion—a department as far above all others "as the heavens are higher than the earth"—this God-given book was meant as an unerring guide, an infallible counselor; and woe to that man who, having access to this Book, disregards its instructions, or builds his belief and practice on something else. In his passage through life to an untried hereafter, man greatly needs a guide and a light; and great is the infatuation of him who, turning away from "the true Light" and the Divine Guide, prefers the torch light of his own finite mind, and deems reason or human science a surer guide than "the oracles of God!" He alone is truly wise who, to the offer that God makes—"I will teach thee in the way thou shalt go, I will guide thee with mine eye"—humbly responds:

Be Thou, O Jehovah, my Guide and my Friend,
Through life's transient journey e'en down to its end,
And when, at Thy mandate, that *end* has come,
With thyself let me have a permanent home.
If Thou art but mine, and I am but Thine.
As a star in Thy crown I shall evermore shine.

MAN, PHYSICALLY AND MORALLY.

BY PROF. I. L. KEPHART, A.M.

Man is a complex being. This is true of him, whether considered physically, intellectually, or morally. All the elements and organs of his body are in sympathy with each other, and act harmoniously. The eye does not interfere with the ear, the nose, the hand, or the foot, but is a servant of and a benefactor to all of them. The head does not antagonize the foot; the stomach, in its normal condition, never assaults or interferes with the liver, the heart, or the lungs, but faithfully performs the functions essential to their well-being; and with equal fidelity do each and all of them serve the stomach, and serve each other. In fact, the marvelous precision with which each organ of the body performs its proper function and, day and night, serves each and every other part, has excited the enthusiasm and admiration of physiologists and naturalists in every part of the enlightened world, and evoked from the astonished poet the exclamation:

> "Strange that a harp of a thousand strings
> Should keep in tune so long."

While it is equally true that in his mental and moral being man is complex—composed of different faculties—it is matter of deep regret that no such harmony in the action of these parts exists, as does between the functions of the organs of his physical being. In truth, the very opposite is the case. Instead of the elements of his mental being, harmonizing with and efficiently subserving each other, they frequently antagonize, make war upon, and sometimes annihilate each other. This is owing to the fact that some of man's mental faculties relate only to his physical being—his mortal career,—while others relate to the welfare of his moral being, and act and prompt in the direction of its best interests.

The intellectual faculties that have to do only with man's earthly career, and must perish when the physical body ceases to exist, only prompt in the direction of, and clamor for, earthly and sensual pleasures, while those that relate to the immortal nature seek to restrain the carnal, and reach out after, and long for, the triumph of the ennobling virtues—those virtues that are durable and look in the direction of eternal life. Avarice clamours for the acquisition of wealth, regardless of the rights of others. The flesh-appetite for food and drink urges in the direction of over-indulgence, gluttony, and drunkenness; but the ennobling consciousness of the superiority of intellectual joys, resulting from a proper observance of the rules of moderation and the acquisition of useful knowledge, instead of becoming a slave to voluptuousness, antagonizes and seeks to curb the propensity to over-indulgence of the carnal appetites. The fleshly inclination to idleness and inactivity is confronted and assailed by the nobler impulses of the soul, urging to useful endeavor worthy of the true man. Hence the strife between the elements of man's mental being, a strife which can only be terminated by the one or the other of these achieving the mastery.

As to which of these shall ascend the throne and reign supreme over the man, he himself must determine. His Creator has constituted him intellectually and morally free. To him is given the high prerogative of determining what intellectual elements shall be crowned sovereign—whether those that relate to the flesh shall become the masters, and bind him to the destiny that attaches to the placing of the affections wholly upon perishable things, or whether, as his Creator designed, these shall be brought into subjection to those elements of his intellectual being which attach to imperishable things, such as righteousness, love, purity, meekness, and joy in the Holy Ghost.

To work out this decision is the business of man's probationary life. The possessing the moral freedom which enables him to make this decision constitutes him a rewardable being. Without this freedom and power he would be incapable of virtue. Between these contending elements of his intellectual being lies the battle ground of his life-struggle. The elements of his intellectual being that relate to his flesh-life were given to him because they are essential to the existence of that life. The thirst for earthly honors, the love of ease, the desire to acquire earthly possessions, all these are essential to man's welfare in this life; but they were given to him to be servants for his use, to be curbed and trained into perfect obedience to the higher faculties of his soul, and not to be permitted to become masters to tyranize over, degrade, and ruin him.

And right here is where man's free moral agency enters the arena and asserts its mission, viz: that of determining to what the man shall attain, and to what place he shall go. Here it is where right hands must be cut off rather than lay hold of an unjust dollar. Here it is that right eyes must be plucked out, rather than the love of purity should go down before the obscene images that threaten to enter through the organ of vision and hang themselves around the palace-like chambers of the soul. Satan seeks, through the faculties of the intellect that relate to the flesh-life, to tempt and ensnare poor mortals into yielding themselves to the control of all the vices. Against this peril God has provided by appealing to man's nobler nature through his judgment, his reason, and all the higher faculties of his soul, by the voice of Nature, the voice of His Word, and the voice of His Holy Spirit.

While the human being is in its infancy and childhood, the Creator's order is that the reason and judgment of the parents act for it, to hold in subjection those faculties that relate to the flesh-life, and prevent their usurping supremacy before reason and judgment are sufficiently developed to constitute the child actually an accountable being—truly and completely a free moral agent. Hence the importance of correct parental training. Many to-day are hopelessly in bondage to the flesh life, chiefly because of imperfect training in childhood. They arrived at maturity to find that, through the incapacity or negligence and moral turpitude of their parents, the carnal propensities have been permitted to develop into gigantic proportions, usurp the throne, and are already ruling with an iron hand; that already "steeds of hell have been harnessed to the chariot of heaven," and now, no matter how loudly conscience may thunder, the Word of God call, and the Holy Spirit warn, and no matter how vigorously reason and judgment may strive to apply the breaks, there is great danger that the fiery chargers will dash home to their own place, carrying the charioteer down to perdition. O, how the child is to be pitied that receives deficient moral parental training!

THE BEAUTIES OF THE METRIC SYSTEM.

BY PROF. MELVILLE DOZIER, A. M.

Editor of the Microcosm:

In view of the wonderful progress that applied science and mechanical art have made in the United States, is it not marvelous that we still cling to the cumbersome tables of our forefathers, to the neglect of a system that is the very perfection of beauty and simplicity?

The man who would to-day advocate or practise the old methods of travel, communication, illumination, or manufacturing, in preference to the modern and infinitely superior methods, would be considered little short of a lunatic. But what more reason is there in the advocacy and practice of methods of computation founded upon accident and caprice, and a relic of barbarism, in preference to one purely scientific, and perfectly simple in its origin, nature, and application?

It is true that in 1866 the U. S. Congress legalized the use of the metric system, and since that time it has been extensively used in our coast surveys, custom houses, drug houses, and by those engaged in foreign trade, but the great mass of the people know nothing about the system, and the computations of every-day life are made by the old methods. In nearly every country of Europe and South America, the metric system is in general use, having been made obligatory by the legislatures of the several countries years ago. This is evidently the only way to secure its general adoption in the United States; and it is a standing reproach to the lawmakers of our country that it was not done long ago. Such statesmen as John Quincy Adams and Charles Sumner saw the matchless advantages of the system, and in their day did what they could toward securing a law making its use obligatory in all matters in which the government was concerned.

Of late years, it seems to have been entirely ignored by Congress, despite the strenuous and very commendable efforts of the Metric Bureau to secure its universal promulgation and general use. If these efforts, which are directed mainly in the interests of business men, have fallen so far short of the realization of that success which they so richly merit, what else can and should be done to compass an end so devoutly to be wished?

To my mind, the direct, and possibly the only plan that promises success, is to educate the young thoroughly in the system at the same time that they are taught the old methods; thus enabling them to contrast the advantages possessed by the two systems in the solution of practical examples by both methods; and that, too, at a time when they have not acquired that prejudice against innovation which always comes with maturity.

In my own classes, I have for years pursued this plan, and with very gratifying results. Children and youth soon learn to love the beauty and simplicity of the method, and, after a very brief experience in its applications, greatly prefer it to the old.

If thorough instruction in the system were universally given in our schools, how quickly would we rear a generation that would demand an immediate abandonment of the awkward, complicated, and thoroughly unscientific methods to which we are now in bondage! Among the many advantages that may be justly claimed for the metric system, perhaps the most striking are the remarkable brevity and uniformity of the nomenclature, and the wonderful facility with which different denominations may be converted into each other.

But *twelve* words are necessary to the expression of every value known to the system; and these twelve possess not only the advantage of expressing mutual relations with accuracy, but also of being derived from languages familiar to the educated of all countries, and to this extent, at least, very easily acquired by the unlettered as well.

How does this compare with the *more than fifty* terms employed in our common tables; and they, too, absolutely devoid of all mutual relationship in meaning, and bearing to each other in value the most absurd and inconvenient relations? In the brief space of one hour, an intelligent boy of suitable age, will master the nomenclature of the metric system, and so thoroughly comprehend the relationship in value of all the terms in any one table, that he will almost instantly, and with scarcely an effort, convert one into another, or one into several, or several into one. Yet, after a lifetime of practice in the common system, even experienced teachers are frequently compelled to refer to the tables to ascertain some of the unreasonable and arbitrary relations of our compound numbers.

The facility with which the expressions of quantity may be interchanged is due, of course, to the use of the decimal notation; the advantage of which over all others is clearly seen in the only sensible table of our common method, namely, the table for Federal money.

The fact that the unit of every table is referable to the same standard, and that standard to a fixed dimension in nature, is another striking advantage of the metric system, and one that should commend it to every lover of the beautiful and simple in art or science. British conservatism and native dislike for anything of French origin will, doubtless, long continue to be effectual barriers against the adoption of this system in that country; and our intimate commercial relations with Great Britain will tend greatly to retard our movement in the same direction.

But, notwithstanding the prestige of British example, the people of the United States cannot afford to sacrifice so much of time, trouble, and useless expense as is involved in the use of the tedious

and complex methods of computation now in vogue.

DIFFERENCES BETWEEN MAN AND THE BRUTE.

BY G. W. LOWBER, M.A., PH. D.

The chasms between the different kingdoms of Nature cannot be bridged by the Evolutionist. It would be as difficult as to erect a bridge over the gulf between Dives and Lazarus. The Mineral and the Vegetable very greatly differ. The Mineral is unorganized; the Vegetable is organized, and originates in a germ, a seed, in something that has organization. Nothing can have life that is not organized, or the product of organization. The Mineral may not have composition, but simply aggregation; the Vegetable is always composed of three elements, one of which is carbon. The mineral preserves the individual as long as the species; the Vegetable preserves the species, but lets the individual perish. The Mineral has no life; the Vegetable possesses life. Life cannot be derived from the lifeless; the Vegetable could never have been derived from the Mineral. No Evolutionist bridge can span the abyss between the Mineral and Vegetable kingdoms.

There are also differences between the Vegetable and Animal kingdoms, which cannot be harmonized with the Evolutionist theory. The plant is largely composed of carbon; the animal of nitrogen. The plant lives on inorganic matter; the animal on organic. The plant digests its food with leaves; the animal with a stomach. The plant commences its development from a seed; the animal from an egg. The plant has no feeling; the animal has voluntary motion and sensation. The plant has no brain; the animal has a brain, and instinctive knowledge. These are a few of the differences between plants and animals, for which the Darwinian cannot account. We also present these difficulties connected with the Animal and Vegetable kingdoms: Mosses are inferior to lycopods and ferns, but of later introduction. The Ganoids or Reptilian fishes, which are among the highest grade, were the earliest of fishes. The Trilobites, found in the early Silurian, are not the lowest Crustaceans. In the Tertiary Age, the monkey appears before the oxen. These facts present insuperable difficulties to the Evolutionist, but none to the Creationist.

We wish, next, to present briefly a contrast between man and the animal; and, then, emphasize certain points. The upright position is natural to man, but not to the animal. Man is a being of progress; the animal is stationary. Man is a ruler in this world; the animal is his servant. Man looks up to God; the animal no higher than this world. Man has language, art, science, and religion; the animal has none of these things. Man desires a future state; the animal is satisfied with the present. No physicist can explain away the fact that God created man in His own image, and the animal for the use of man. With the animal, death ends all; with man, it is an introduction to a higher life.

We do not see how any physicist can carefully study the following points, and then regard man as simply the result of evolution:

1. Man differs from the brute in certain physical characteristics. He is the only animal that is clearly two-footed and two-handed; and, consequently, fitted for an erect posture. The release of the upper extremity from all use in locomotion and the erect posture enable man to subdue Nature and to study the heavens. Man is the only animal that has a chin, and phrenologists teach that there is something wrong in the upper story when man is deficient in chin.

2. Man is a scientific being, and seeks an explanation of phenomena. The brute never does this; it only has the faculty of sense—perception. In addition to this, self-consciousness, reason, understanding, and judgment are necessary to constitute man a scientific being.

3. Man is a being of progress, but the brute is perfectly stationary. Man crosses a river on a log, and from this experience constructs boats and ships; the brute crosses over, and is no wiser. To constitute man a being of progress, it is only necessary to add imagination to the faculties which have already been mentioned.

4. Man differs from the brute in being the subject of moral and religious obligation. To the faculties mentioned, we add conscience and free will, and man is a moral and religious being. The brute is not blamed for its acts, but man is responsible for his. Says one, "The brute can be so educated as to reason, possess free will and conscience;" but this is not true. The elephant is often referred to as a remarkable example of intelligence; but it is very much overrated. The showman teaches the elephant to perform by applying plates of hot iron to its feet, while there is music; and removing them when the music ceases. By an associated impulse, it commences performing when the music commences.

LANCASTER, KY.

RECIPROCAL ATTRACTION.

BY T. F. MCBEATH, A.B.

PROPOSITION.

Two bodies mutually attracting each other, the TOTAL FORCE (*G.*) *is equal to twice the force exerted upon the smaller by the larger; and varies directly as the product of the masses.*

DEMONSTRATION.

Let A be a body containing m particles; that is, with a mass m. Let B be a similar smaller body, containing m' particles, or mass m'.

Now the theory of gravitation, as propounded by Newton and universally accepted by scientists since his time, is that "EVERY PARTICLE *of matter in the universe attracts* EVERY OTHER PARTICLE *with a force varying inversely as the square of the distance*" (Newton).

Now, if this be true—and we think it is—*each particle* of A attracts equally *every particle* of B. But since B has m' particles, *each particle* of A acts upon B with a force of m'; but A has m particles, and if *each* act with a force m', the whole m particles will exert m times the force of one, or mm'. But, by the above statement of Newton, *each particle* of B attracts, likewise, *every particle* of A; therefore, since one particle at B acts equally upon m particles at A, it follows that *each* particle in B exerts a force upon A equal to m; but B has m′ particles, and since each exerts upon A a force of m, the whole mass or m' particles will exert a force equal to $m'm$. Therefore the total reciprocal force is equal to $mm'+m'm=2m'm$. Q. E. D.

2nd.

It is evident that if A or B be doubled, the total force would be doubled, etc. For give A twice as many particles, and you double at the same time

B's power upon it, for there are twice as many particles for each one of B's to act upon. A's power is doubled because it has twice as many particles to act. Then, since total force is equal to sum of the two forces, and since doubling the mass of one doubles the *mutual* power of both, it must double their sum, or *G*.

Therefore, if *A be constant,*
G varies as B (*m'*).
But if *B is constant,*
G varies as A (*m*).

Therefore, the general formula must be, G varies as *mm'*. Q. E. D.

OBSERVATIONS.

If the above be true—and, admitting Newton's proposition, they are really self-evident deductions—quite a number of our astronomical *formulæ* must share the fate of "Newton's Yardstick." In the above we see that the moon really pulls itself toward the earth with exactly the same force that the earth exerts upon it, the moon; and that whatever *part* of the 16 feet in the fall of a stone during the first second is taken as *gravity*, only *one-half* of it (the part) can be due to the earth's attraction!

Again let us write it, $G=\frac{mm'}{D2}$!

ENG. GER. SCHOOL, CUERO, TEXAS.

REMARKS.

Prof. McBeath will no doubt find something else to correct in "astronomical formulæ" after he reads our reply to Captain Carter elsewhere, whose article takes the same view as the above, but treats it more exhaustively. We give both articles as the dying struggle of the great underlying principle of the gravitation law, as originally laid down by Newton, and as accepted by all astronomers. Of course Prof. McBeath, as well as Capt. Carter, is right, if Newton's central principle of gravity, as quoted, is correct. If this foundation of the law crumbles, as we claim that it does, in our reply to Captain Carter, as printed in this number, of course the "Q. E. D.'s," so liberally dealt in by modern astronomers, break down in a promiscuous heap.

GLIMPSES OF THE SOUL AS A SUBSTANTIAL ENTITY.

REV. T. M. GRIFFITH.

If the soul survives the body, and still lives as an organized substance, it must have means of making its presence known. So powerfully has the theory of the soul, as merely "the principle or power which thinks and feels," affected the Christian world that they have stubbornly refused to accept any evidence from experience or observation as to the reality of the spirit world. And thus one of the most convincing evidences of immortality has been ignored with derision and contempt. We have shown in a former article (in December Microcosm) that the Bible abounds in references to the fact that spiritual beings may be recognized as substantial and organized entities. But History is no less fertile in the production of such proofs. In fact, the ancient world lived and breathed in the full belief of supernatural and substantial existences. There is an unwritten history, wide as the world and ancient as the race, proving the same belief. Every nation, almost every neighborhood—has its traditions and strange stories of spiritual manifestations, in every variety of form, and attended with such circumstantial evidence as would be received in any court of justice in affairs of *this* world, yet, as these things are not cognizable to the outward sense, they are simply sneered at, and thrust aside.

But the facts are such as we cannot afford to despise. We *must* recognize them or else be open to the charge of prejudice and bigotry. Bushnell's able work, on "Nature and the Supernatural," refers to some of these facts. Professor Zöllner's fascinating book, "Transcendental Physics"—quoted by Joseph Cook, contains a most impartial and scholarly report of mysterious manifestations, which he witnessed in Leipsig, in connection with Henry Slade, such as the tying of knots in cords, the two ends of which were hermetically sealed; writing within double slates, locked together; the passage of coins through solid wood, leaving no trace of their passage, but hot with the vibration of their molecules; these are scientific facts. Prof. Zöllner explains them on the theory of a "fourth dimension of space," known only to beings of another sphere. Frances Power Cobbe, in her "Octave of Essays," entitled "The Peak in Darien," lays down the hypothesis, that if there is an immortal world beyond the physical world, it must often be witnessed by the dying, just as the Pacific ocean bursts upon the view of the traveler when he reaches a certain peak in Darien. She then gives numerous instances of dying persons who have, by look and by words, expressed a sweet surprise, as the future world unfolded to their vision.

Christian biography multiplies these instances by thousands. The inner sense—the sixth sense—is sometimes called into play before the five senses are closed. This would be the case more frequently, were it not that both the physical and spiritual senses are affected by disease. Moreover, a sensual life is not favorable to the unfolding of this strange power to see into the invisible world. The dying Stephen was not the only one who saw Heaven opened. Even little children, as we all know, are able to exercise this hidden sense, and tell to all around, the wonders and glories of the new world. It is high time to accept these facts, in this age of materialism, as powerful proofs of a real and substantial immortality.

TAMAQUA, PA.

ELECTRICITY THE MOTOR POWER OF THE SOLAR SYSTEM.--NO. VIII.

BY B. T. KAVANAUGH, M. D., D. D.

REPLY TO DR. WILFORD HALL'S OBJECTIONS IN NOV. MICROCOSM.

A reply to Dr. Hall's objections has been deferred to this late date for two reasons (1), that I disliked to break into the body of the subject under discussion, to attend to side issues, before a more complete exposition of the Electric Theory had been fairly set forth; and (2), when a new question is presented, not heretofore brought under consideration, I prefer by patient reflection and investigation to satisfy myself whether the position I am to take is true, and in strict harmony with the whole theory of solar-electric action.

I am greatly indebted to Dr Hall for the suggestion of the doubts and difficulties found in his mind, as expressed in the following sentences:

"The cardinal question involved is, whether

magnetic attraction, however powerful the magnets, will act at such enormous distances in view of the well-known rapid decrease of effect witnessed in the most powerful magnets known. At this point, we confess that our doubts are unmanageable. But we propose to hear the Doctor out before deciding."

Before attempting to solve the doubts here expressed, we premise a few general remarks.

It must be borne in mind, that the theory which I advocate, is original and new, so far as my reading extends, and hence I have no authors to consult, and only obtain my knowledge of the subjects involved, from close study of the works of God, as seen in the material universe; I have, of course, to interpret the designs of the Divine Author in the regulation and control of the various members of the Solar System by such active agencies and forces, as are known to exist commensurate with the regions they occupy. In pursuing this line of study, I am compelled to travel over unexplored ground, with no footprints of predecessors to guide me, relying wholly upon close observation and the compass of reason and sound logic, under the lights manifested by the great solar centre of the system, with such reflected rays, as are thrown out by every member of the planetary family.

This subject was pursued with patience for forty years without the remotest idea of ever presenting it before the public. While residing in Texas, I ventured to deliver a lecture on this subject in Soule University, which I was requested to repeat before the Liceum of the city of Houston. At the close of the second lecture, I was urged by a number of gentlemen present, competent judges, to reduce my lectures to writing, for the benefit of all who might take an interest in the matter. I objected at first, as the subject was of vast magnitude, and it would appear like presumption in one so obscure as myself to take in hand the task of exposing the errors of the modern system of Astronomy, supported by many of the most gifted and learned minds the world has ever produced; but I finally concluded to test the correctness of the theory by publishing it, and thereby exposing it to the criticism of the learned world. Four lectures were published, and a thousand copies disposed of. While these were in hand, I visited some of the colleges of the Western States, and lectured before the most learned men of the country, which had the effect to draw out many questions involving different parts of the theory. In considering these, the whole subject greatly enlarged itself upon my hands. To incorporate the new discoveries to which these questions led, a second edition of seven lectures was published and largely circulated, all with a view to elicit criticism. Up to the time the present series was commenced, the positions taken have never been publicly controverted.

Having made other important discoveries giving perfection to the system, I proposed to the editor of THE MICROCOSM, that with his consent, I would furnish him a series of articles incorporating all the improvements made up to the present date, and I stated in my first article that I wished to test the correctness of the theory by exposing it to the Editor and numerous scientific readers of THE MICROCOSM.

The doubts and difficulties suggested by the Editor of THE MICROCOSM, are such as I aim to draw out, and are not only very acceptable and kind, but it will be found they lead to the elucidation of an important feature of the theory, and one essential to its completeness. To reduce the objection to a distinct question, we state it as follows: Does Positive Electricity waste, or exhaust itself in passing from the Sun to the Earth?

In considering this question, the Editor, in supposing that it does, doubtless arrived at that conclusion from observations made upon Electric machines, and attempts to conduct the generated electricity along lines parallel with the surface of the earth; whenever this is attempted, there will be great waste, and the line upon which it is conducted will extend to a comparatively short distance before it will be totally lost. The reasons for this are manifest. The line of positive electricity conducted, say upon a wire near to, and horizontal with the earth, will be on all sides surrounded by negative electricity, which has a great affinity for it, and hence the line of positive will soon be taken up and neutralized. If his conclusions have been drawn from lines so situated and acting, then his doubts are well taken and certainly correct.

But if he applies this reasoning to rays of heat, light, and electricity emanating from the Sun, and supposes that they should be wasted or weakened in their passage to the earth, or to the other planets, then upon an investigation of the subject, he will find his doubts are groundless. This will appear from the following considerations:

1. The Sun is the only fountain source of Positive Electricity in the Solar System, united as it is with light and latent heat. The distance of the Sun from the Earth is variously estimated from 92 to 95 millions of miles. A ray of light is supposed to pass this distance in a fraction less than eight minutes. Each ray being positive repels every other ray, and hence so far from being attracted by anything above or around it, every surrounding force compels it to retain its own elements within itself, while the repelling force of the Sun behind, and the attractive force of the Earth in front, bear it rapidly to its destination, until it reaches the lower atmosphere, where negative electricity prevails. The time is inconceivably short in which it passes this thin stratum immediately surrounding the Earth, and hence there is no dissipation of its force until it strikes the Earth's surface. Experiments have shown that the Sun's rays may be passed through a lens of ice without a dissolution of their parts, until brought to a focus upon combustible matter, the light being converted into heat will produce combustion as readily as if passed through a lens of glass. In view of this fact, we may safely conclude that the elements of each ray, as it passes through the intermediate space between the Sun and Earth, undergo no change, and it emits nothing but light in its whole course. It is known that the intermediate space is intensely cold, and heat is evolved only when the ray strikes an opaque body, when the light is instantly resolved into heat. The atmosphere is not warmed by the direct passage of the Sun's rays, but by the reflected rays from the Earth's surface.

2. But the Editor's objections may be considered in another light, which is probably the correct one, that is, he speaks of very "powerful *magnets,*" as if he alluded to magnetic iron, or a fixed magnetism in any solid body. If this is the light in which he places his objection, then the subject must be considered from that point of view, and it becomes necessary to arrive at a distinct understanding as to the magnet he alludes to.

Of necessity, we must define and understand the terms we use. Properly speaking, Magnetism or Electro Magnetism is a secondary form of Electric action, and pertains only to the Earth, and is not

identical with Electricity proper, or Positive Electricity, which, in our system of worlds, has its source alone in the Sun. The term Magnetism, therefore, must be confined to the terrestrial sphere.

It may be truly said that the whole earth is a magnet. If the proof of this is demanded, we reply that it is polarized, and polarization occurs only in magnetized bodies. As this cannot be denied, the Editor's objection must be confined to terrestrial limits, and, if so, we agree that in the exhibition of its forces, magnetism is confined to a very narrow limit compared to the forces of the Sun.

Now, in applying these objections to the theory that I am endeavoring to set forth, let us preserve a clear and distinct discrimination as to the meaning of the terms we employ. My whole theory is based upon the declaration found at the head of each article, "ELECTRICITY THE MOTOR POWER OF THE SOLAR SYSTEM," and electro-magnetism is only incidental to the great power relied on. It is true that electro-magnetism has an office to perform under the controlling action of the Sun operating upon it through the superior force of Positive Electricity. To apply these forces in their action, one upon the other, in producing the diurnal and annual revolutions of the Earth, we refer our readers to the use made of the one and the other in all the preceding articles of this series, in which it will be perceived that in no case do we assign any motor power to the magnetism of the Earth, except so far as to make it a counterpart to the positive electricity of the Sun.

To explain more fully: As the Earth is a great globular mass, heavily charged with electro-magnetism—a body to be moved, and *not* the mover—by taking on the form of negative electricity, opposite to that of the Sun for which it has a powerful affinity, it is found to possess just those elements which both attract the positive, and enable the positive to seize upon it as a leverage, a great bond of power, by which to wield it in its course and give it rotation upon its axis.

To be a little more explicit: When the Earth, revolving upon its axis, has turned away its heated surface from the falling rays of the Sun, while passing through the shades of night it loses its heavy charge of positive electricity, and becomes negatively electric; as it again emerges from the darkness, the strong affinity between the negative and positive causes a strong attraction between the Earth and Sun on that side. The short arm of the negative grasps hands with the long arm of the positive electricity, and they mutually pull together and raise the rising side of the Earth until it reaches the zenith, when the surface becomes so heavily charged that it is repelled from the Sun, which gives the Earth its diurnal motion.

The annual motion is produced by the accumulation of so heavy a charge of positive electricity on the eastern, or receding side, that it acts as an enormous battery driving the whole globe in the opposite direction in the pathway of its orbit. This action is greatly aided by the fact that the western side is in a negative electric state, and, as regards positive electricity, furnishes a vacuum into which the Earth plunges, where it finds no resistance, and hence an easy escape from the driving force behind, viz.: the repulsion of positives, and is thus forced forward in its orbit. This example serves to illustrate the relative outgoing forces of the magnetic Earth on the one hand with its short arm; and, on the other, the vast force of the positive Sun, with its long arm reaching through space without exhausting its powers.

More fully to sustain this position, we may with propriety say that the Sun expends itself by sending off of the substance of its own compound, light heat and electricity, throughout its realm, without the diminution of its force.

In our first article on the character of the Sun, it was shown that the light heat and electricity emanating from its shining surface were substantial matter, so much so, that it must in the nature of things exhaust itself and expire, unless furnished with supplies to balance its expenditures. The rays of light that fall upon the earth are a part of the Sun itself, only in an attenuated form, so that we may say that every planet "lives and moves and has its being" in the borders of the Sun.

It will be remembered that it was also shown that the exhausted rays of positive electricity, passing from the dynamic to the static condition, were drawn back to the Sun, where they entered into its body through open caverns known as "spots on the Sun," where, being quickened into the dynamic state, they are again repelled into outer space to perform their legitimate offices in whatever region they are directed.

We have, as far as we understood the designs of the Editor, vindicated our theory from the objections so respectfully made. If we have failed to apprehend his true meaning, we hope he will more clearly define it. The terms magnetism and electricity proper, are too often indiscriminately used, the one for the other.

I cannot close this reply without gratefully acknowledging to the esteemed Editor of THE MICROCOSM the obligation he has laid me under by the complimetary manner in which he has been pleased to allude to the character of my articles, and his recommendation to scientific "readers to fully consider and even study them."

Fair and friendly criticisms are still invited, as I always feel benefited thereby. We have no other object than to ascertain and establish the rightful authority of TRUTH. This will free us from all error, both in science and religion.

MT. STERLING, KY.

THE TRIUNE NATURE OF MAN.

BY PROF. H. S. SCHELL, A.M.

A scientific investigation of the nature of man, as well as the careful study of the Sacred Word, shows him to be a triune being, having three sets of faculties: the body, with its organs and functions; the soul, or life-force, with its perceptions, involuntary powers and understanding; and the spirit, with its intellectual and God-like attributes.

The body was constructed for a temporal residence of the soul and spirit, and receives impressions from both; the soul acquires knowledge by observation, instruction, and experience, but this knowledge does not reach beyond material and sensual objects, while the spirit is the home of conscience, and possesses intellect, thought, reflection, the power of choice, the apprehension of moral and religious truths; reasons about God, perceives the nature of His laws, investigates the phenomena of the invisible and spiritual universe, comprehends the existence of a life beyond the present, and reflects about eternity, good and evil, right and wrong.

The soul of man, as well as his body, was created, but his spirit is an efflux from God, and is, therefore, eternal. Were man an animal only, and destined to end his existence at death, his spirit, with its wonderful attributes, would have been unnecessary to a purely earthly life; but the possession of these higher faculties is proof of his unending existence.

Without the soul, the body would have no knowledge of the world or of anything in it; and separated from it, would know nothing either of pleasure or pain; and the soul has no knowledge of the invisible and spiritual, except by its connection with the spirit.

Two kinds of education are progressing in man,—one of his animal soul, the other of his spirit; the first fits him for usefulness here; the second prepares him for an eternal hereafter. The true life of man begins at death, as his spirit is then released from the material body which held it, and goes as a veritable organic entity to a spiritual world, there to await a re-union with its material body, which is to be made spiritual and immortal.

Between instinct or animal mind, and intellect or spirit-mind, there is a chasm which separates man from all other animals, and materialistic philosophers, in all ages, have endeavored in vain to bridge over this chasm. For about sixty centuries each race has been spectators of the same occurrences, but with all his observation, the brute has never advanced a single step, and is now where he was six thousand years ago; but how different with man, whose intellectual progress commenced with his observation, and has been onward from generation to generation, until now his acquirements are absolutely marvelous. Brutes being without reason, the existence of understanding and judgment is impossible, and the brute must become another creature before he can manifest the intelligence of man.

"The bee builds its comb in conformity to pure ideas of reason, but it does not thus build because it knows such ideas, but because of the peculiarity of its perceptions, sensations, and physical structure, all of which render its thus building a necessity."

True philosophy, in its investigations, accepts both of the Creator's revelations to man,—the visible universe and the Bible,—and by so doing can explain the mysteries of man's spirit, and has capacity to grasp the problem of human life both here and hereafter; but materialistic philosophy, which ignores the Bible, and seeks for the solution of mental as well as spiritual phenomena in a knowledge of the material universe only, has ever failed, and will always continue to fail. Besides this, its falsely constructed theories are pernicious, as they tend to undermine faith, morals, and religion, and their only use is to call forth investigations which exhibit their intellectual, moral, and logical weakness.

Had the visible universe, alone, been sufficient for a solution, by man, of the mysteries of his nature, a written revelation would not have been given; but, being required, it has been given, and the downfall of a philosophy which rejects it and teaches that man, with his God-like attributes, was evolved from a brute, and, like the brute, when he dies, becomes extinct, is only a question of time, and that not far distant, as its death-blow has been given by recent publications; and though once rampant and unblushingly insolent, its most renowned champions are now, apparently, almost as *silent* as the grave.

THE LAWS OF MIND.—No. 1.

BY REV. J. W. ROBERTS.

In presenting to the public any system or theory of science or philosophy upon any subject, a due regard for the intelligence of the reader, as well as justice to the system itself, demands such a statement of the facts and principles involved therein as shall at least exhibit it with reasonable precision and clearness, for the consideration of those who may desire to examine it; and this is especially true of any theory which appears to depart from the preconceived opinions of men.

As the object of the writer is to present views upon the great problem of MIND under new phases, and, if possible, to make more intelligible some matters which have heretofore been greatly mystified, it becomes necessary to lay the foundation, as a wise master-builder, upon the solid rock, so that it will stand when the "rains descend and the winds blow and beat upon it." Hence the necessity, in digging for this substantial basis—as will more clearly be made apparent in the progress of the inquiry—to present at this juncture some

INTRODUCTORY REMARKS.

It is here assumed, what it is hoped will hereafter be made reasonably clear, that there are three entities in the universe, which may be designated *Spirit, Substance, Matter;* and that to one of these entities everything in nature belongs, whether "visible or invisible."

The term entity is employed, not because it fully expresses the idea involved, but because it is the best word our language furnishes for the purpose, and I do not wish to address the reader in an unknown tongue; and for the same reason technical terms will be avoided as far as possible. The term entity conveys the idea of *something* in contradistinction to *nothing*.

In the classification of entities, matter includes everything of a gross nature which is accessible to the five senses, and most things that are recogniza ble by one or more of these senses.

Substance comprises those things which are usually designated as intangible; such as gravity, magnetism, etc., and as will be more fully developed as the subject under contemplation is evolved.

Spirit embraces those entities that possess life and intelligence.

Our language being constructed on a material basis, and to convey ideas of material things, it is not the most desirable medium through which to convey just and clear conceptions of spiritual matters; but being the best we have, it must be employed; and the writer hopes to make all points reasonably lucid to the careful and intelligent reader.

On the ascending scale the series runs thus: *matter, substance, spirit,* or *vice versa* on the descending scale; spirit the highest, matter the lowest, and substance the intermediate entity. The signification attached to these terms, where the same varies from that given by the lexicographers, will become apparent as the steps of the investigation advance.

That which is common property will be used as such, due credit being given in cases where specific material is used.

The object of the writer is not to combat other men's views, but to present his own; and when these conflict with others, to endeavor to show

where the truth is to be found, not in a belligerent spirit, but in the interest of what is conceived to be a "more excellent way." Committed to follow wherever truth leads the way, the pointing out of any errors into which he may fall will be esteemed the highest favor.

With these preparatory statements, let us now proceed to more weighty matters.

There are two theories held as to the origin of mind; one that it is material, or the outgrowth of matter, the other that it is not, but has a higher origin. The theory of the material nature or origin of mind will be first examined.

The essential elements of matter are set down in all the works on material philosophy to be, *Inertia, Impenetrability, Indestructibility, Magnitude, Divisibility, Attraction*, and *Porosity*. Of late, however, divisibility is not held as a property, it being conceded that the ultimate atoms of matter are indivisible. There is some difference of opinion concerning attraction; but upon the first three properties named above there is no diversity of views; and for the present this inquiry will be limited to these absolutely *essential* attributes or properties of matter. Of these qualities *inertia* is the most striking, because it is the most readily perceived, and to it we direct attention.

This term signifies utter and unavoidable *helplessness*, so that matter, no difference what its form or where found, is *inherently*, in the very essence of its nature, *incapable of doing anything*. It cannot move itself when at rest, not stop itself when put in motion. It is this property of matter, in connection with its environments, which ever has and ever must stand as a bar to the perpetual motion of human-made machinery or devices.

As each atom of matter is helpless, an aggregate of atoms is only an aggregate of inertia. A world is as helpless as each individual atom of which it is composed. A mountain can no more move itself than a mote. Water can find its own level; but the ocean cannot lift itself the millionth part of an inch above that level any more than can the smallest drop composing its mighty volume. These admitted facts may be formulated into this law: *Quantity adds nothing to the inherent properties or disabilities of matter.*

And just here is where physical evolutionists make a fatal mistake. They attribute to matter results which it is impossible for matter to accomplish by reason of its *inherent incapacity to produce them*. To bridge over this chasm the *imagination* is called upon to hypothecate an assistant to matter, which is termed *force;* but this does not help the case in the remotest degree, for this reason: Force, as an *active principle*, has no more existence in matter than *life*. In the sense that a rock is *hard*, or iron is *tough*, it may be admitted that matter has force; but this species of force, if it can be termed force at all, is just as *inert* as any other property of matter. Hence *force as an active principle never can be found in a purely physical universe*. This is self-evident. So is the following infallible axiom:

No fact in nature will or can be contradicted by any other fact. Hence no other truth in the universe can be found at variance with the fundamental law of the *inertia* or *helplessness of matter*. As force, an active principle, is not a property of *inert* matter, but is of exactly an *opposite nature*, it cannot be derived from matter, and its origin must be sought in some other direction. This is as clear as logic and light can make any proposition.

But force itself, as an abstract principle, if such it is, possesses no intelligence; and if there is only a *physical* universe, *it is nothing but matter*, and therefore subject to all the disabilities of matter. This also is self-evident. Another axiom may here be laid down: *Neither matter nor anything else in nature can impart that which it does not possess*. This law is only another method of expressing that fundamental principle of science, "Out of nothing nothing can come."

Here, then, we have reached the solid rock, which is of three-fold thickness, and upon this foundation a superstructure can safely be erected, for, if properly constructed, it will abide.

Let us now test evolution by these axiomatic truths.

Matter is inert and can *do nothing*. No other fact in nature will antagonize this truth.

Matter has no intelligence; therefore it cannot communicate intelligence to any other thing or substance in the universe.

Matter has no activity; hence it cannot impart activity to anything; and so it is impossible for force as an active principle, or motion of any kind, to be born of matter.

These axioms rest upon the bed-rock of truth, and cannot be moved.

Evolution, as a physical science contradicts every one of them. It makes active force a creature of inert matter. It compels matter, which has no life or intelligence, to communicate both life and intelligence to other portions of nature. Therefore evolution, in its very inception, is an impossibility. Its very first act is to require the performance of a miracle; and every step in the ascending gradation from the moneron to man is a miracle; for each one requires the communication to its successor of some quality which it does not itself possess. By the side of this countless series of miracles all those claimed by Christianity, Mythology, and Paganism dwindle away into remote insignificance. If anyone doubts for a moment this sweeping declaration, let him take the system and follow it up, step by step, from its incipiency to its *finale*, and he will become thoroughly satisfied that it is born of an impossibility, is cradled in miracles, and has no food to subsist upon from infancy to age but the most absurd of miraculous and impossible pabulum. At the conclusion of the analysis, in the light of the self-evident propositions laid down, the investigator will be led to exclaim: "The half has never been told!"

It does not relieve this monstrous system of miracle and credulity in the slightest degree to say that some one in each of these series in the upward march of development became wiser and better than its peers, and transmitted these acquisitions to its progeny; for that is exactly the self-evident impossibility which holds matter and its environments—in a physical universe—with an everlasting grip, from which there is no escape, and to fly in the face of which is the same irrational and self-stultifying idea which is weighted down with self-destruction, *that nothing can produce something*. No argument is required to prove this; for the thing that had not could not obtain or transmit that which it did not possess, and which nothing else possessed from which it could be derived. It is also equally manifest that where material entity holds sway, no new powers can be evolved from any source whatever, because the eternal helplessness of *all* matter remains a perpetual estopel to its receiving or bestowing what it never had and never can have. And what is

true of matter in this respect is true of every other entity in existence. It is the ceaseless violation of this absolute, unvarying and inexorable law on the part of evolution, from its incipiency to its culmination, which places it outside the pale of reasonable hypothesis and beyond the domain of philosophical research.

And what is true of evolution is as forcibly true of any other system which develops life or intelligence from matter, or any other element that matter does not possess. All these theories are of necessity compelled to bring something out of nothing.

In view of the impregnable facts herein set forth, which are as old and as enduring as matter, Physical Evolution must be set down as an impossible method of accounting for all that multitude of mundane phenomena which exist on all sides of us, and which are above the sphere of material helplessness. The old dogma that an omnipotent Being can create something out of nothing by His almighty fiat, is lucid logic in comparison with this gigantic system of stupendous miracles, *all performed without any antecedent intelligence!* The man who can believe this, and then sneer at the miracles set forth in the Bible, or any other system of religion, has surely never measured the height, depth, and breadth of his own irrational cupidity.

It is in no spirit of hostility to evolution as a system involving great research and the expenditure of much mental force that these views are set forth, but solely in the interest of truth and true science. True philosophical inquiry never abandons fundamental principles or departs from those axioms that lie at the base of all research which can endure.

Having thus demonstrated from the *inherent constitution of matter* that it is impossible for life, intelligence, or active force to emanate from it under any possible contingencies, and finding these grand forces of the universe all about us as the factors which of all others most interest us in every direction in all the avenues of nature, it becomes necessary that their existence shall be accounted for on some other hypothesis, which shall be reasonable, and whose adequacy to that end shall be within the scope of sound philosophical procession; and this will be the next step taken in this inquest into the arcana of Science.

"OUR EARTHLY HOUSE."

BY ELD. J. G. BURROUGHS.

Man presents a triality of phases. These may be termed physical, moral and intellectual. Each phase is a wonder. The *physical* phase is a microcosm—a miniature world. No wonder, therefore, than one of old exclaimed, when contemplating the nature of his make-up, "I am fearfully and wonderfully made." Our house is an epitome of the earth, and, hence, is "of the earth earthy." Its mechanism is truly wonderful, and *immeasurably* beyond the imitative genius of man. It is a great house; a beautiful house; a living house; a moving house; a working house; a growing house; a living enigma!

It is made up of many parts, and each part is a wonder within a wonder. Every part, however large or small, is of exact mathematical proportion. Anatomatically considered it is made up of,

I.—Bone, nerve, sinew.
II.—Artery, vein, capilary.
III.—Blood, water, lymph.

Chemically considered our house is made up of

I.—*Ponderables*—or confinable substances.
II.—*Imponderables*—or *in*confinable substances.

The first class is divisible into the following, to wit:

I.—Solids.
II.—Liquids.
III.—Gasses.

To the first subdivision, or solids, belong, lime, soda, sulphur, iron, magnesia, potash, phosphorus, manganese, carbon, silica, alumina—pure clay—gluten, sugar, starch, gum, cascine, fibrine, albumen, dextrine, hamatea, ceret, gelatin, pepsin, pancreatin, ammonia, sodium.

To the second class, or liquids, belong the following, viz.: Water, blood, muriatic acid, acetic acid, formic acid, lactic acid, butyric acid, succinic accid, oxalic acid, rosasic acid, benzoic acid, uric acid, hipuric acid, diabetic acid, picric acid, phosphoric acid, &c., &c.

To the third class, or gasses, belong oxygen, hydrogen, carbon and nitrogen.

IMPONDERABLES.

The elements of this class are

1.—Caloric.
2.—Light.
3.—Electricity.
4.—Magnetism.
5.—Ether.

In the foregoing we have given the main chemical constituents of our wonderful house. In various proportions they enter into and form the different parts of the living organism of both man and animal.

Many of the same chemical constituents that enter into the make-up of animal organism enter also largely into the vegetable. The main elements of the vegetable organism may be summed up as follows: Water, gum, starch, gluten, sugar, tanin, lignum, resin, coloring matter, wax, oil, bitumen, narcotine, albumen, fibrin, alkali, acid, phosphorus, iron, mangonesia, &c., &c.

These formative or proximate principles are composed of oxygen, hydrogen, carbon and nitrogen. They are, therefore, divisible into two classes, to wit:

I.—Those containing oygen, hydrogen and carbon only.
II.—Those containing the four elements—oxygen, hydrogen, carbon and nitrogen.

The first class of proximate principles is again divisible into the following, to wit:

I.—Those containing more oxygen than is necessary—in union with hydrogen—to form water.
II.—Those containing only the requisite proportion of oxygen and hydrogen to generate water.
III.—Those principles where hydrogen is predominant.

The first class embraces all vegetable acids, such as acetic, malic, citric, rumex, tartaric, oxalic, quinic, tanic, benzoic, prussic, silicic, phosporic, &c., &c.

The second class gives rise to gums, sugar, starch, lignum. The third class to oil, bitumen, resin, wax, and the coloring matter of leaves—chlorophyl—&c., &c.

As before stated, the second class of the proximate principles of the vegetable kingdom is made up of the four elements, oxygen, hydrogen, carbon and nitrogen. These four elements give rise to albumen, gluten, narcotine, hernatine, (the red coloring principle of woods and plants) alkali, extractive matter, indigo, etc., etc.

Thus we see that oxygen, hydrogen, carbon and

nitrogen (especially the three first elements) enter into and form all the proximate principles of vegetable substances, of whatever character or clime. Indeed the whole animal and vegetable economy is reduceable to these four primary elements—oxygen, hydrogen, carbon and nitrogen. These four primary elements follow the law of the digit and alphabet. We have nine digits, or symbols of numbers; but, by the addition of a cipher, we are enabled to make an endless number and variety of mathematical calculations. We have but 26 letters in the English alphabet, yet, by different numbers and methods of arrangement, we have an endless variety of composition and expression of thought. So is it with these four elements. By different numbers and proportions we have presented before us all the different families, orders and species of the vegetable world. By these four elements and the five imponderables—heat, light, electricity, magnetism, ether—we have presented before us all the various families, orders and species of the animal world.

It is a remarkable fact that, notwithstanding man has the power to analyze animal and vegetable substances, and discover their chemical constituents, he has not power to recombine these elements and form them again into animal and vegetable organisms. Had man this power, he would have the creative power of Deity.

But, right on the threshold of this argument we are met with a somewhat plausible objection from an anonymous author. He says: "The chemist, by the association of two parts oxygen, four hydrogen, two carbon and two nitrogen, can make urea. Alantoin has also been produced artificially. Two of the proximate principles being realized by human care, the possibility of realizing or forming all is established. Thus the chemist may be said to have it in his power to realize the first step in organization." (See *Vestiges of Creation*, page 83.

The possibility of forming one two, or *more*, of the *proximate* principles entering into the compositions of the animal or vegetable organization, we do not deny. But we do deny that man has (or ever *will* have) the power to give *organization* and *life* to these principles. There is no law in chemistry, philosophy, or *any* of the natural sciences, by which this can be accomplished. Many infidel scientists readily admit this fact, and bring it forward as an indubitable evidence against the Bible doctrine of the resurrection of the dead. They are not willing that the resurrection of the dead shall take place upon other than scientific principles; and, not finding any law in Nature by which this is to be, or can be, effected, they deny the doctrine in toto! But they are ignorant of the fact that there is no law in Nature by which an organized existence, either animal or vegetable, can be produced. The law of evolution, as taught by Spencer and others, has signally failed to develop any fact or truth in this particular. The law of evolution proper teaches the necessity of *in*volution in order to *ev*olution. There can be, therefore, no evolution without an involution, Spencer, Darwin and others to the contrary notwithstanding.

We argue, therefore, that all organized existences, of whatever character, originated with a great First Cause; and that that Cause was the living Intelligence whom the Bible designates as God.

As there is no *law* in the Universe of God by which organization can be given to proximate principles—vegetable or animal—neither is there any law in Nature by which these principles, when dissolved, can be thrown together and made to assume the organic form. Hence, the resurrection of a dissolved organization is dependent upon the same Power that gave it origin, and that Power is God.

"Why should it be thought a thing incredible with any one, that God should raise the dead?" If He can give organization in the first place, so can He in the second place, and so will He. In this is our hope. If our house be dissolved, it will be rebuilt, beautified, and made immortal, incorruptable, imperishable, unchangeable, and therefore eternal.

THE RESURRECTION OF THE DEAD. (THE OTHER SIDE.)

BY REV. PROF. STEPHEN WOOD.

The different views honestly held by Christians upon this subject cannot be united into one by quotations from the Bible selected by opposing parties, as each person will construe in accord with his established views and ideas of interpretation. Yet it is a subject of great concern to us all, and has direct bearing upon many other important question in theology. The views of thinking men are gradually changing upon this subject in the direction of a more consistent and rational exegesis than that which was held in the dark ages.

In studying the Bible teachings upon this subject, we need not refer to the Old Testament, as the doctrine is not there found; and in searching the New Testament we must carefully distinguish between *Resuscitation* and *Resurrection*. Several cases of resuscitation are mentioned in the Bible, as the case of Lazarus and others; but they are never referred to as cases of the resurrection. Besides, these subjects died again: the subjects of the resurrection "die no more." We need also to study and understand, if possible, the sublime import of our Lord's own words: "I am the resurrection and the life; he that believeth in Me, though he were dead, yet shall he live; and whosoever liveth and believeth in Me shall never die." We must also distinguish carefully between the resurrection above referred to and the resurrection of which all are subjects. It will also be a great aid to us in an earnest investigation of the subject, to inquire whether or not it is anywhere said, or even intimated, in the Bible, that the material body shall be the subject of the resurrection; or, whether it is anywhere stated that the soul shall be *re*united to the natural body, or to any other body from which it had been separated. And finally, it would be well to inquire what benefit to the subjects, or what use in the universe would be served, by a recreation of the physical bodies at some future time, and what necessity, under Divine Providence, will demand the occasion for *such* a time. All material bodies fall back into their original elements, and thus perform a continued use in the great economy of Nature; so that there will be no material bodies that can be the subjects of such resurrection at some future day, unless recreated for the purpose.

SOUND OF RUNNING TRAINS.

DEAR DR. HALL:

In No. 6, Vol. 2, page 191, Microcosm, "A Student" asks you to explain certain sounds produced by running R. R. trains, etc. The phenomena alluded to are common to all railroads, and are noticed by all close observers living along the

line of a R. R. My dwelling is located in the concave of a curve nearly one mile long on the W. M. R. R. The circle of the road and the location of the dwelling are such that the distance from the dwelling to the road is nearly the same—from one-fourth to one fifth of a mile. Now, when the train runs over this curve, very little sound is heard at the dwelling; in fact, many trains pass that we hear no sound from at all. This morning, January 22d, I stood in my front yard when the Express East was passing, having an unobstructed view of the train for one mile, but no sound at all was heard. But when the train reaches a point two miles west, the whir is so distinct that we hear it at night in our beds when the house is closed. The same thing occurs when the train reaches a point two miles east of us. This, however, has never been a mystery to me, as the track of the road at each point is in a direct line with our dwelling; and all close observers know that the whir, or rumbling of a running train, is always heard more distinctly in the direct line of the rails than latterly. Some of the repair men know this. I have seen some of them lay their ears on the rail to hear the train while miles away. Persons walking on a curved part of the line are often run over by coming trains, while it rarely happens on a straight line. If the wave theory of sound were correct, and these air sound-waves were exactly similar to water-waves produced by the falling pebble, then the sound must be heard with the same distinctness at the same distance from the sonorous body all around; but since in the concave we scarcely hear the whir of the train at a distance of ¼ of a mile, yet hear it distinctly when two miles away in line with the track, is evidence that it is something else than air-waves.

Now, my dear Dr. Hall, the Scriptures teach "Let him that is taught in the word communicate to him that teaches in all good things," (Gal. vi., 6.) While I am not taught in the sciences, yet I know these facts by long observation, and I communicate them to you to help hold up your hands in the work in which you are engaged. I wish you God speed.

Yours Truly and Sincerely,
D. P. SAYLER.

NEWTON AND THE PRINCIPIA.

BY REV. J. I. SWANDER, A.M.

God moves in history, and manifests his power in the march of its progress. His personal presence in the government of the universe is a truth which nothing but the insanity of atheism will dare to deny. With infinite wisdom and intelligence He originates and controls the dynamic forces by which the successive ages of the world are marshaled into the line of its historic onflow. The activities of men are the agencies of God. The great man leaves his impress upon the peculiar work to which he is called by Providence to apply his plastic hand; yet each age is productive of its own master-spirit, rather than the production of such master-builder's molding genius. Some ages are so big with great events as to give birth to a number of towering intellects, each one the master in his divinely-appointed sphere. Such was the age which gave the seventeenth century of the Christian Era its peculiar prominence on the dial plate of time. The tree of intellectual inquiry and progress, planted in the revival of letters, was stimulated to vigorous growth by the Reformation of the Church, and, after sending its penetrating roots into the best soil of Europe, brought forth its specimens of finest fruit in the lives and labors of such men as Newton, Leibnitz, and others, who passed, either in close succession or as a cluster of cotemporaries upon the central stage of time's intellectual theatre.

Among the illustrious men of that remarkable age Sir Isaac Newton shines out as a star of the first magnitude. The natural strength of his great intellect, the happy combination and harmony of his inductive and demonstrative faculties, the rich material provided by his predecessors in the science of astronomy, the valuable assistance of his mathematical cotemporaries, the influence of the Royal Society, the pride and possible partiality of his countrymen, all contributed largely toward the success of his genius, and the splendor of his fame. He lives in his durable work, and will continue to live while "the heavens declare the glory of God." As long as the reflecting telescope brings a better view of distant worlds within the more commanding range of mortal vision, and makes the laws of their government the most sublime study for the powers of the human mind, so long will it be impossible for anything, except the total depravity of base ingratitude, to dim the luster of his immortal name.

But Newton was not the only great man in that age, so distinguished for its intellectual giants. Even in his own favorite field of astronomical science, the names of Copernicus, Galileo, Kepler, Halley, and Flamsteed do not suffer seriously in comparison with one who either began his labors in the light of their previous discoveries, or shared the fruit of their cotemporaneous toil. Newton merited a renown as enduring as the stars; yet the stars, themselves, may cease to shine before the legitimate boundaries of his fame are fixed by the competent historian's impartial pen. To what extent did national prejudice and pride wreathe his brow with laurels plucked from the merits of other men? Without answering the foregoing question, we record the following assertion: Had Newton been born at Leipsic, and Leibnitz at Woolthorpe, the Royal Society would probably have been differently partial in that question of mathematical discovery and personal honor, referred to them for decision, by the great German philosopher in his unsuspecting German honesty. That Leibnitz was an original inventor of the differential calculus is now generally admitted by the intelligent readers of revised history. Newton, himself, conceded as much; and it will always appear to the glory of the great English astronomer that he was too much of a Christian to desire, or seek, greatness at the sacrifice of Christian honor. The human race may well be proud that these two illustrious characters belong to the family of man. Newton was the greater and more successful mathematician because he focused the most brilliant rays of his genius upon the one grand goal of his laudable ambition: Leibnitz was his equal in native powers of intellect, more versatile in genius, and more boundless in his erudition. Leibnitz was greater in the possession of that penetrative gift so peculiar to the pioneers of German thought: Newton surpassed him in his ability to utilize his knowledge for the practical advancement of science. If Newton was the greater physicist, Leibnitz was the more profound metaphysician. The German philosopher was searching far and delving deep to discover the mysterious impulse of being, while the English astronomer

was soaring above the clouds, in his efforts to demonstrate the laws of that invisible agency by which the Creator propels the machinery and perpetuates the harmony of the material universe.

Neither was Newton infallible. As a member of the fallen family of man, he shared the infirmities of the race. Pope's couplet—

> "Nature and Nature's laws lay hid in night;
> God said 'Let Newton be,' and all was light,"

contains more English pride than poetry, and, still, more poetry than truth. Though born on Christmas day, he was not *the* light of the world. Although the *Principia* is a master-piece of mathematical skill, it is not the production of unerring wisdom. It contains light enough to make darkness distinctly visible. The above expression should be considered as a flattering compliment to the noblest work of any mortal man. Newton's great mind was not capable of supposing that the *Principia* was perfect, and that it would need no revision in the progress of the ages. A consciousness of its defects was probably one element in that reluctance which inclined him to desire a suppression of its further publication. Neither is there any evidence that Halley, in assuming the financial responsibility of bringing the astounding work before the public, looked upon its author as the *avatar* of astronomical science. Such superstition enters a more modern temple; such idolators pour out the oblations of their sycophancy in a more modern worship. They fill the front pews of the scholastic Church; and their hands go up with holy horror at the mere mention of "Newton's oversights." They consider it no sacrilege to revise the authorized version of the Holy Scriptures, and correct the "oversights" of King James' translators. They also seem to think it eminently proper to change the English text of God's Word in order to make it read more in harmony with those most ancient extant manuscripts recently discovered by the same spirit of search and research which has since blessed the human family with "*The Problem of Human Life.*" Some of them are possibly ready to march with Robertson Smith in his crusade of criticism upon the very subject-matter in the oracles of the Most High; or, perchance, swell the ranks of Beecheronean vandalism with a determination to either dry the fountain or dam the stream of God's Revelation to man; but a critical examination of Newton's astronomical calculations is too sacrilegous for their pious toleration. While they cannonade the *Pentateuch*, they canonize the *Principia*, and swear, with an idolatrous veneration for the bones of a fallible man, that Wilford Hall shall not stand in the assembly of the righteous, because, forsooth, he has dared to question the immaculate conception of Newton's "yard-stick."

Not too fast, nor too far, gentlemen! At this point in the proceedings we wish to place upon record an expression of our positive conviction that if the learned and most central criticism of the age has the courage and countenance to carry its inquiries into the holy domain of inspiration, there is consistency and common sense enough among the lay members of the Scientific Church, in its holy communion of truth, freedom, and progress, to insist that "Every *man's* work shall be tried of what sort it is." Let *us* not be misunderstood. Our position is that the essential essence of God's Word is forever settled in heaven (Ps. 119: 89); and that the human elements, entering into the constitution of the Bible, are proper matter for human criticism and correction, and will so continue until "that which is perfect is come." Let the trial go forward whenever the court is competently constituted and clothed with the ermine of lawful jurisdiction. God, Himself, challenges man with a "prove me now herewith;" and the Bible authorizes a critical investigation of itself when it enjoins the duty to "prove *all* things, and hold fast that which is good." With such authority to search and prove the very oracles of God, we are not disposed to look upon the *Principia* as the superlatively sacred thing in the sanctuary of Science.

This question has been discussed in the consecutive numbers of the MICROCOSM for the last twelve months; and still "the combat deepens, as onward rush the brave." The editor has charged Newton's great law of gravity with some serious defects. This charge has been made with such confidence, and followed up with such tenacity of purpose and voluminous array of reasoning, as to call forth the countercharge of "presumption." This countercharge is one that we shall neither attempt to palliate nor deny, for fear that the editor's modesty might be disposed to turn our paper away from the "microcosmic door," under the impression that it contains a "complimentary reference." The editor is possibly presumptuous; but in the present case we think that his presumption consists in presuming that there is nothing in science more sacred than the truth, and that no century, prior to the golden age of absolute and acknowledged perfection, has any right to install a scientific pope for all the subsequent centuries of the world's progressive history. *Such* presumption need offer no apology. No age is anointed with the oil of infallibility above its successors. This truth underlies the first principles of Protestantism, and gives strength to all sound Protestant theology. While we reject the preposterous claims of ecclesiastical popery, consistency requires us to dispute the infallibilism blindly attributed to Newton, or to any other mere man. We are bound *to* the past, but not *by* it in any such way as to destroy the lawful freedom of the present.

The question under discussion in the MICROCOSM is one of great *gravity*, and we shall endeavor to be grave in the expression of our humble opinion concerning the interesting battle now in progress. To be candid, however, we must acknowledge a tendency in some of our facial lines toward a fearful inclination from the plane of our constitutional and characteristic sobriety. At times we feel like closing the MICROCOSM and offering an apology for the solemn levity of our intention to act upon good sanitary advice:

"Laugh when you must: be candid when you can."

Yet this is no time to be indulgent with such emotions; hence we proceed to note our several serious convictions concerning the more obvious features of the great gravitation controversy:

1. The editor has found himself called upon to battle with men of scholarly attainments, as well as thorough training in the art of polemical war. *They* are mathematicians, and exhibit an intimate acquaintance with all the terms laid down in the books. They are also on the defensive, and have the advantage of occupying a strong position, so far as there are any elements of strength in the parapets of popular opinion. Moreover, they are putting forth their most Herculean powers to strengthen the weak points in the fortress and hold the fort, if possible, against the truth itself. They seem to be inspired with the conviction that they are called upon to "vindicate Newton and immortalize themselves."

2. The master-mind among the vindicators is

Prof. Goodenow. If the editor should lose the battle, and be called upon to surrender the sword with which he has dealt such telling blows, he would still honor himself by placing his useless weapon into the hands of such a valiant veteran and victor. We do not wish to intimate that Prof. Goodenow is either a better or an older soldier than Dr. Hall, but one who, like Ben Battle, had enlisted in the *line*, and, consequently, enjoys all the superior advantages of scholastic drill. At times his precise military evolutions lead us to wish that the editor had not provoked the controversy. It was not the professor's fault that Newton's "yard-stick" went to pieces. Had the material of the yard-stick been more flexible and elastic, it might have survived the terrible test to which it was subjected. Let these brave men change sides in the controversy, and the speedy result may chronicle a victory whose value to true science would give a new significance to "Battle Creek," and an everlasting fame to an illustrious hero. Why not? The professor seems as honest as a man can be when committed to the wrong side of the question. We have great regard for his manifest integrity, supreme respect for his ability, and nothing but superlative admiration for that inimitable dexterity by which he has proven himself capable of dodging points and arguments, which, if fairly faced, would long since have terminated the controversy with an unconditional surrender of the Newtonian army. If the intelligent readers of the MICROCOSM will examine again, with studious care and impartiality, those parts of the gravitation controversy, published during the last few months, and especially as recapitulated in the February number, they may gratify any morbid curiosity of their nature by viewing, what seems to us very obvious on the part of Prof. Goodenow, a colossal stride of self-contradictions, equalled only by the felicitous language and false syntax so conspicuous in the polyglot mathematician of Bethany College.

3. We have noticed: (*a.*) The several vindicators of Newton have disagreed among themselves as to just what the great astronomer meant to teach in his gravitation law of squared-distance-inverse, as applied to the question of the moon's divergence from a given tangent, and the double displacement of both earth and moon by virtue of reciprocal attraction. (*b.*) They have not agreed as to the best line of defense against the assaults of the MICROCOSM. General symptoms of *lunacy* are the only common badges of their mathematical brotherhood. (*c.*) They have contradicted themselves, and changed both their terms and tactics when met by truth and valor, and pressed to close engagement. (*d.*) They have conceded several points which they had warmly disputed in the beginning of the discussion. (*e.*) They have blown the breath of suspicion upon the dogma of Newtonian infallibility by charging the great astronomer with using a "rough measurement" in the service of "pure mathematics." (*f.*) They have thus, consequently, played the pitiable poltroon when it was found necessary to forsake their master in order, if possible, to save themselves from inevitable defeat in the last dark ditch of desperation.

4. It has been intimated on the part of the defense that the editor is no mathematician, and, therefore, "does not understand Newton's methods." Suppose we admit that there is a semblance of truth in the intimation. Such admission would give no relief to that wretched garrison who are now trying to hold an untenable fortress. It is rather worse, for both its builder and defenders, if the castle be taken by awkwardness and pop-gun artillery—worse for the prodigious *Principia*, if its defects should be exposed (as now seems probble) by the criticisms of one who does not profess to be an adept in the scholastic sense of scientific skill. It is our opinion, however, that the editor has given evidence of very respectable mathematical talent and acquirements. Yet this point is not important to the main question at issue. Is the *Principia* impregnable at every point of approach? That is the question. It is not a matter of mere human "methods." Perhaps that Providence who once chose the "despised" things to "confound the things which are mighty (Cor. 1: 27) has returned to *His* "methods" of "bringing to naught things that are; that no flesh should glory in His presence." The treasure of invincible logic is sometimes placed in earthen vessels, that the work of "vindicating" the truth may redound to the declarative glory of God, contribute to the signal advancement of science, and make more manifest the merited mortification of mathematical mummies.

AN OPEN LETTER.

DEAR DR. E.:—I regret that you have not the leisure for a thorough examination of the "*Problem*" and THE MICROCOSM; and it would be too heavy a tax upon my time to give you an elaborate answer to your enquiries.

I do not know whether Dr. Hall—or Wilford, as we love to call him, for by that name we first made his acquaintance—is a Swedenborgian or not. But if he be, does that fact weaken his resistless logic in support of the great Bible doctrine, that in the beginning God made the heavens and the earth? Is not a Swedenborgian who traces his ancestry up to the forming hand and generating breath of the Father Almighty, more worthy than the infidel who claims a baboon for his father, who traces his blood to the veins of apes, and dogs and mud-turtles? Is not he worthy of praise who logically proves that the human soul is an entity, and that God and men can live, and move, and think, and speak, and feel, without being wrapped up in a physical organism, as against the horrible theory that God never made anything; that there is no God; that the human soul is a myth, and that a revelation is impossible?

Good men stood aghast at the bold assertion of facts, and the plausible deductions of reputed scientists; and a few lilliputians, afraid that their scholarship would otherwise be questioned, sought refuge in the subterfuge that the Bible did not pretend to teach science, and was as liable to mistakes on that subject as any other book. Then Wilford courageously stepped to the front, and, single-handed, entered the contest; smote the Philistine to the earth, and leaping upon his prone carcass, drew the giant's own sword from his grasp, and severed his head from his body; and, as he lifts that reeking head on high, vain is the attempt to hush the thundering applause of Israel's hosts with the cry of "Swedenborgian."

Prof. Blank has not written me; but he had better make a thorough examination before he charges Wilford with materialism. Is it materialism to deny that the Bible says Deity made something out of nothing? All possibilities are possible to Almighty power; but there are such things as impossibilities. It is impossible for light and darkness to harmonize in the same space without modifying each other. It is impos-

sible for a piece of metal to be frozen and hot at the same time. It is impossible for truth and falsehood to witness the same fact. It is impossible for the same person to be a fiend and a saint. Wilford clearly proves that God did not make *man* out of nothing. When Paul says "the things that are seen were not made of things that do appear," Wilford thinks that he meant "they were made out of *invisible* things, the *real*, though *invisible suostances* of the *spirit*-world, which *proceeded from God as the first cause.*"

If he can prove that any substance originally came from God's elemental essence, I shall have no quarrel with him. I would much prefer that view to a descent from a monkey; and if he should fail to prove it, I shall not quarrel with him so long as he admits that God made me with His own hand, and gave me life with His own breath, and that my forefathers were not spawned by an oyster.

Is he charged with materialism because he says that oder, magnetism, electricity, sound, the human spirit, angels, and even Deity Himself, are substantial? "There is a natural body, and there is a spiritual." If a body, then it is substance; not a material substance, but a spiritual substance. If there is such a thing as a spiritual substance, the question is yielded as to possibility. Substance and matter are not necessarily the same.

Is he charged with pantheism because he assumes that all things came from Deity, notwithstanding he believes that men and angels will have a distinct, individual existence forever more?

But what of these peculiar views of Wilford? If he should fail to prove them, does it follow that his logic against evolution and the wave-theory is at fault? If he cannot prove that sound is a substance, does it follow that an air-wave can pass through a solid bar of iron a hundred feet long in the fragment of a second?—that the sound of clapping two books together at one end of a tin tube will blow out a candle at the other end, where the louder sound of a bell cannot do it? If he should fail to prove that all things came from the elemental essence of Deity, does it follow that a revelation is impossible, that spontaneous generation is true, and that glorious man is but a developed tadpole? Are his peculiar views, which he says he may change at any time, of such a grave character as to impel, or even justify, us in withholding our support from him in his puissant blows against the formidable foes of God and man, by constantly carping at these peculiar views?

Wilford has greatly unsettled public confidence in reputed scientists, and brought them down to a level with historians. He has proven that many scientific demonstrations were never demonstrated, and many of their deductions are as worthless as "old wives' fables." In this he is sustained by Edison, who complains that he has lost valuable time and been thrown off the track by the text-books, which state as facts things that are not facts, and experiments that were never performed, and upon which they have founded so-called scientific truths.

In my opinion, no man has conferred so great a blessing on this present generation as Dr. A. Wilford Hall, and I hail with glad and high expectation the steady increase of classic minds and noble souls that are pressing forward to his support, and expect soon to hear his echo in the pulpits of this land, throughout its length and breadth.

LYNCHBURG, Va. L. W. BATES.

REMARKS.

Those who are troubled about the supposed Swedenborgian bearing of the *Problem of Human Life*, as intimated in the above *Open Letter* of Rev. Dr. Bates, can see a statement of the simple facts of the case by reading our reply to the *New-Church Quarterly Review* in another place.

QUESTIONS ON GRAVITATION.

BY CAPT. R. KELSO CARTER.

Every particle of matter attracts every other particle of matter in the universe, directly as its mass and inversely as the square of the distance between them.—Newton.

Remark. It is perfectly plain that Newton here speaks of particles of *equal* mass.

1. Given two units of mass, A and B, at any finite distance apart. If A pulls B, and B pulls A, is not the total pull double that exerted by A?

2. Is not the proportion of pull exactly divided between them?

3. If A be held fast, will not the total pulling force operating to move B be still double that exerted by A?

4. If B be falling towards A, will not one half the moving force be due to A, and one half to B's reciprocal pull on A?

5. Will not one half of B's velocity of fall be due to A's pull, and one half to B's own pull?

Remark. Action and reaction are equal.

6. While A is pulling the equal B, is A's attractive force all used up in the operation, or can it simultaneously pull other bodies?

7. If it be all used up does not this flatly contradict Newton's principle, quoted at the head of this article?

8. If it be all used up, then if the earth were engaged in pulling an equal earth, what would become of the gravitation upon men and animals?

9. If the earth were in contact with an equal earth, what would prevent me stepping off into space?

10. If standing on the pole, could I not consider that the gravity of my hemisphere was all occupied in pulling the other hemisphere, and vice versa; so that I could walk off anyhow?

Remark. These questions may seem almost childish, but they draw to a point, in a way that everyone can understand.

11. If A is eighty times heavier than B, *does not the single unit of B pull equally on each of the* 80 *in A?*

12. Does not *each of the* 80 *in A pull equally on the one in B?*

13. Is not the total attraction between both thereby exactly doubled, *just as before?*

14. Is not exactly one half of the total pulling force due to A (each of eighty particles on one = 80), and one half due to B (one on each of 80 = 80), just as before?

15. Is it not perfectly plain then, that *one half* the total pull between two bodies always belongs to each, no matter how great their difference of mass?

Remark. Action and reaction are equal.

16. If A and B are still 80 to 1 in mass, but *both* free to move towards one another; and if, as seen above, the pull on each is exactly equal in amount total (1 on each of 80, and each of 80 on 1), will not their respective velocities of approach be inversely as their masses?

17. That is, will not B (having a mass of 1 pulled by a force of 80) move with a velocity of 80; and will not A (having a mass of 80 and pulled by a force of 80) move with a velocity of 1?

18. If A be held fast will not B still fall with a velocity of 80?

Remark. Initial velocity of course is referred to, or rather the velocity at any certain point of time.

19. Suppose a third body C, having a mass of 40. According to questions 11-15, will not the pull of A be, each of 80 on each of 40 = 3,200; and the pull of C be, each of 40 on each of 80 = 3,200?

20. Then, according to questions 17, 18, will not the total pull of A on C (3,200 on 40) give a velocity of 80, *just as before?*

Remark. Action and reaction are equal.

21. Would not the moon draw another moon of equal size with a force equal or proportional to its mass?

22. Would not the moon draw the earth eighty times harder than it would another moon?

23. Is it not of vital importance, in considering the amount of gravital force exerted by a body, to see *what it is pulling on?*

24. Is it not true that the moon pulls *each particle* in the earth with one-eightieth the force with which the earth pulls each particle in the moon?

25. If one-eightieth mass were added to the earth it would only pull on the moon, if added to the moon it would pull on the earth: is there not a clear difference of 79 here?

Remark. These questions might be considerably extended from a great many common sense standpoints; as for instance, starting with the fact that the earth pulls ten pounds ten times harder than it pulls one pound, we have only to multiply a little to carry the proof up to the moon and earth themselves. These questions have been written with the intention of setting forth in plain common-sense terms, the simple astronomical facts that *one half the total attraction* between any two masses is due to each, and that *one half the velocity of fall* in a falling body is due to itself, the other half being due to the body toward which it is falling; and that these facts hold true no matter what difference may exist between the two masses.

In order that no one may think that there is anything very original in the above; nor anything differing in the least from the accepted theories and experiments of gravitation, I present a few quotations from leading authorities. 1. Sir Isaac Newton. His principle quoted at the head of this article contains all these facts; for it is plain that if each particle attracts *every other* particle, then the total attraction between two units of mass will be two.

Between 1 and 2, it will be: 1 on each of 2 equal 2 and each of 2 on 1 equal 2, total 4. Between 2 and 2 it will be, each of 2 on 2 equal 4 and the same, total 8, etc., etc. In each case half the total belonging to each. To show that this is the clear understanding amongst astronomers and students, I call attention to the fact that Newton's principle is generally quoted so as to read that the force between two masses is "directly as the product of the masses." See Newcomb's Popular Astronomy P. 81, also the able article on gravitation in the Encyclopedia Britanica. No man stands higher to-day than Sir William Thompson on Physical subjects, and he says, in his Natural Philosophy, P. 345:

"Every particle of matter in the universe attracts every other particle, with a force whose direction is that of a line joining the two, and whose magnitude is directly as the product of their masses," etc. That is a unit of mass draws in this way:

One on 2 equal 2; 1 on 3 equal 3; 1 on 4 equal 4; 1 on 5 equal 5; 1 on 6 equal 6; 2 on 1 equal 2; 2 on 2 equal 4; 2 on 3 equal 6; 2 on 4 equal 8; 2 on 5 equal 10."

Again Sir William says on the same page:

"Experiment has shown that the attraction exerted by any portion of matter upon another is not modified by the neighborhood, or *even by the interposition* of matter; and thus the attraction of a body on a *particle* is the resultant of the several attractions exerted by its parts. Still further, let us take this plain statement of the matter from the able work on Astronomy by James C. Watson, of Michigan University, page 19. He says:

"The absolute or moving force with which the masses, m and n, tend towards each other is therefore *the same on each body* (no matter how different in size), which result is a *necessary consequence of action and reaction.* The velocities, however, with which the bodies would approach each other must be different, the velocity of the smaller mass exceeding that of the greater in the ratio of the masses moved." And lastly, Prof. H. N. Robinson, in his Astronomy, page 172, says:

"The earth attracts the moon by the force $\frac{E}{R^2}$

The moon attracts the earth by the force $\frac{M}{R^2}$

the two bodies are drawn together by the force $\frac{E \times M}{R^2}$

in which, E = the mass of the earth, M = the mass of the moon, and R = the distance between them."

At first sight it might appear that Professor Robinson here meant to say that the total amount of pull exerted by the moon would be less than that of the earth in direct proportion to its smaller mass; but a moment's thought and examination show that he could not have meant any such thing. He clearly accepts the foundation principle of Newton, and we have seen that that principle absolutely implies the truth of the whole matter; and that it is so understood by all the leading writers on Astronomy and physical science. When he says "The earth attracts the moon by the force E," what *can* he mean other than that the mass E draws with its whole force upon *each particle* in M? Just as Sir William Thompson: "the attraction of a body *on a particle* is the resultant of the several attraction exerted by its parts." Of course Prof. Robinson was familiar with the multifarious works on Astronomy which used the expression "the product of the masses" to express the full total of one body upon another; and equally of course he knew that an increase of mass in either body would necessitate an increase of pull. On page 184, he says:

"If the earth contained more matter, it would attract with greater force." Would attract what? Evidently the unit of mass. He was perfectly aware that the object to be attracted had a great deal to do with the amount of force. In this view, and in consonance with the general tenor of his work, it is plain that he meant by E, the total pull of all the particles in the earth on *every particle* in the moon, which would be each of 80 on 1, = 80; and that M means the total pull of all the particles in the moon on every particle in the earth, i. e., 1 on each of 80 = 80. In other words, E means the product of the masses, and M means the product of the masses. And all this is as it should be, in accord with the grand principle that—*Action and Reaction are equal.*

PA. MIL. ACADEMY, Jan. 27, 1883.

☞See Extraordinary offer on last page.

THE NEBULAR HYPOTHESIS.

BY PROF. J. R. SUTHERLAND.

For the consideration of the readers of THE MICROCOSM, I offer the following as a mathematical consequence of the fundamental assumption of the "Nebular Hypothesis," as it is stated in Snell's *Olmstead's Astronomy*, page 211 Art. 415, to wit, "The whole space occupied by the solar system, and extending far beyond its limits, was filled with nebulous matter, in an exceedingly rare and intensely heated condition." I do not know that any one has ever offered anything similar upon this subject to what I am about to present, or indeed that any one has yet very strongly objected to receiving this hypothesis as science, but be it condemned or approved, I present what follows.

We will not go beyond the orbit of Neptune, though the hypothesis allows us to go *far* beyond. The mean diameter of Neptune's orbit is 5,556,000,000 millions of miles. Cube this number and multiply it by $\frac{355}{113} \times \frac{1}{6}$ and we have the volume of the nebular sphere thus, 171,508,919,616,000,000,000,000,000,000 $\times \frac{355}{113} \times \frac{1}{6}$ = 898,017,499,464,306,784,630,766,961,648, cubic miles. According to Kohler's calculation, given in Silliman's *Physics*, page 64, the volume of the earth is 259,756,014,917 cubic miles, American standard measure. The united volume of the sun and planets, allowing for the planetoids and moons of the solar system twice the volume of the earth, is 1,297,220–182; then 259,756,014,917 × 1,297,220–182 = 336,960,697,670,690,740 cubic miles the volume of all the bodies of the solar system. This volume is contained in the nebular volume 2,655,051,163,747 times. One hundred cubic inches of common air weighs 31.074 grains Troy. At 62½ lbs. avoirdupois to one cubic foot water, one hundred cubic inches of water weighs 25,318-287 grains Troy The specific weight of the earth is about 5-5 water, whence we find that equal volumes of air, water, and earth weigh respectively 31-074 grains, 25,318-287 grains, 139,250-578 grains. Having these relative amounts of matter by weight contained in equal volumes, and dividing 13,925-578 by 31-074 gives 4,481, the density of the earth compared with common air. The average density of the sun and planets is 52-100ths that of the earth; 52-100ths of 4,481 = 2,330-12 the density of the solar bodies compared with air. Equally distribute the matter of the solar system throughout 2,330-12 times its present space and its density would be 2,330-12 ÷ 2,330-12 = 1 air; but since the volume of the nebular sphere is 2,665,051,163,747 times the volume containing the matter of our system the density of this matter, when dissipated throughout the space assumed by the hypothesis, would be 2,665,051,163,747 ÷ 2,330 = 1,143,798,783 times less than air. On page 228 of his large work on physics, Silliman tells us that in the receiver of an air-pump, "At each stroke of the piston the air undergoes renewed rarefaction until the amount remaining in a good instrument is about one-thousandth of the original quantity, and the space within the receiver may be regarded as a vacuum." By dividing 1,143,798,783 by 1,000, we discover that the original nebulous matter, or whatever it was, must have been 1,143,798 times thinner than "the vacuum" of a good air-pump. It has been discovered that as we pass out into the nether regions of space, heat rapidly decreases, so that philosophers conclude that *in vacuo* there is no heat; yet "The Nebular Hypothesis," tells us that this original *vacuum* was *intensely heated*. According to Hæckel's method of reasoning, I suppose it would require but a small effort of the imagination to conceive whence came this heat, and how this vacuum was heated. With this array of figures before me, I am forced to conclude that the "Original Nebular Hypothesis" is, at least, one million times *thinner* than "a vacuum." What grand conceptions are embodied in these words, "star-dust," "nebulum," and "cosmogony!" Shall we believe this hypothesis and reject the "Rib Story," and finally the "Story of the Cross?" "God alone is great," is wise! With Him the wisdom of man is foolishness, for "He taketh the wise in their own craftiness. They meet with darkness in the day-time, and grope in the noonday as in the night," but, "Touching the Almighty, we cannot find Him out."

CHAUNCEY, Ill.

SOMETHING OUT OF NOTHING.

BY REV. M. STONE, D. D.

Some of the contributors to THE MICROCOSM seem to have retreated about two thousand years, to take up that old heathen idea, *the eternity of matter*, as a scientific axiom. They assume that it is impossible to make something out of nothing. That will do very well for an atheist's axiom, but it is liable to a very serious objection on the ground of inconsistency, because the denial of a God does not harmonize very well with the ascription of the attributes of God to matter, viz.: Eternity, Ubiquity, Omnipotence, Omniscience and Infinite Wisdom; for these attributes are undeniably manifested in the creation.

The argument of the writer in the January number was from the doctrine of impenetrability, that is, the Omnipotence of God, filling immensity, would preclude the possibility of introducing anything else. Then God must be matter, or we must conclude that all beings and all things are God. We must apotheosize ourselves and all created things. That would be pantheism *par excellence*. If this theory is entertained by *theists*, it is liable to two serious objections. 1st. It assumes what they cannot prove, that God could not originate matter, thus setting limits to His power, and leaves the origin of matter unaccounted for, unless we make it eternal. If we make it eternal, and make it an emanation from the substance of God Himself, on the poetical principle, "whose body Nature is, and God the soul," we need to explain those scriptures which manifestly deny the materiality of God. This theory is too gross to be credible. It assumes that its advocates *by searching have found out God*. They have gone a long way back of Genesis. This view sets limits to the Most High in plain contradiction of the teachings of the Scriptures.

It may not be important for us to know the origin of matter at all, but it is not easy for us to believe that it *happened*, that is, that it never had an originator, for that would seem to contradict the superlative skill and wisdom with which it is adjusted and adapted. There are too many marks of design in the number and quality of the materials, and their adaptations to each other, to give its origin to *chance*. And we cannot possibly believe that it made itself. Therefore we have but one way to dispose of its origin, and that is to suppose that somebody made it, or, if you please, created it and found room for it without annihilating Himself, just as surely as somebody now manages it. The Hebrew word Bara, which occurs so often in

Genesis, was rendered by the seventy by two Greek words, *κτλειν Ποιειν* (and they ought to know both their vernacular and their adopted language), and yet they seem to have used the first of these two words as having a higher signification than the second. But perhaps it is not quite certain that that word necessarily means to bring something out of nothing; but it is certain that it has been so understood for ages by the best scholars, and it harmonizes with our conceptions of Deity, "as before all things and by Him all things consist," or else we must adopt one of three absurdities, *the eternity of matter, chance*, or *self-creation*. It is self-evident that a reference of the universe of matter, to an Omipotent, Omniscient being as the originator or creator (in the common acceptation of that term) is more consistent with reason, and much better harmonizes with Scripture. Rather than adopt a polytheistic or a pantheistic solution of the creation, it would be preferable to say frankly, "*I don't know*," though perhaps a little humiliating There is a very strong tendency in these days "to be wise above what is written," not only among skeptical scientists, but believers in Christianity are so cowardly that they bow down to scientists, and even excuse God from meddling with his works, as if *Law*, or some nameless *something* or *nothing* can originate and control all things, and any attempt to foist a Creator upon this universe is a scientific impertinence of these times.

REMARKS.

If Dr. Stone really has the mental capacity to believe that God created the material universe out of *nothing*, in the absolue sense, for one we applaud such a stalwart faith, and raise no objection; but he should hardly place in the category of atheists and pantheists those who think that He made the worlds from Himself, and thus framed them "not from things that do appear," implying that they were made of some sort of *invisible substance*—not of *nothing*. If Dr. Stone really thinks the very existence of matter proves its creation out of *nothing*, then the existence of *spirit* should drive us to the same conclusion, namely, that it was originally created out of *nothing*, thus making it necessary for God himself, as "a Spirit," to have been originally created. If the substantial or entitative Spirit of God existed from eternity without creation, and out of which the universe of minor spirits and intelligences have emanated as infinitesimal drops, which Dr. Stone will hardly doubt, is it not reasonable to suppose that the other half of the creation was framed also out of some substance connected with God's personality, rather than out of *nothing?* Really if one-half of man—spirit, life, mentality—was an emanation from God, and not a creation out of *nothing*, we prefer the consistent conclusion that the other half came into existence in the same way.

"A FOOL'S ERRAND."

This is the heading of an editorial article in *Manford's Magazine*, the Universalist organ of Chicago and the West. This "Fool's Errand," in some inexplicable manner, is made to apply to *Universalism Against Itself*. How it is, we do not pretend to know. Possibly the editor means that his magazine, sent out to check the progress of this book, has gone on a "fool's errand!" The editor says that the first sentence in the *Introduction* is a "monstrous falsehood," and then repeats it *verbatim*, as if his first asseveration was not entirely worthy of credence. That sentence is:—

"The system of belief denominated Universalism, teaches that all men will be saved irrespective of *moral character*."

Now the truth or falsehood of this statement depends, of course, upon the meaning of the phrase, "moral character," not upon the fact of "all men" being saved, since no Universalist denies this. We are ready to join issue with the editor upon the truth of this very statement in the Introduction, and can prove that it is not, by any means, a "monstrous falsehood," and will show that the "character" which the Universalian doctrine proposes at the resurrection for men who die in their sins, in order to fit them for Heaven is, not "moral" at all, but *coerced* holiness. "Moral character" can only be acquired by voluntary and intelligent obedience to moral laws. Is it possible that the editor of *Manford's Magazine* can not grasp this plain distinction? As well talk about a *filthy* man acquiring a *cleanly* character by being forced into a bathtub and held there till he is washed! But here is something still more important.

The editor asserts that we told the Rev. Dr. Flanders (a Universalist clergyman with whom we held a four-days debate) that we originally "wrote the book to please the Methodists," and that "Brother Flanders" told him so! Now we do not believe that Brother Flanders ever told the editor anything of the kind, for we do not think, from what we know of the Doctor's "moral character" that he would tell such a "monstrous falsehood," even if he does not believe in an "orthodox hell." But, at all events, whether we "wrote the book to please the Methodists" or not, we notice that they are mightily pleased with it, and so are a good many others, judging by the unprecedented demand for the work, more than a thousand copies having just been sold in a single week.

REV. DR. ROBERTS ON LAWS OF MIND.

In publishing the first very able article from this contributor in the January number, we were not aware that he was a minister. Hence the credit to "J. W. Roberts, Esq." We are pleased to learn the true professional status of a contributor whose papers have such an unmistakable ring of the genuine coin. The series of papers, begun in this issue of THE MICROCOSM on "The Laws of Mind," are positively of great value to science and religion, and from what we have read from the pen of this writer we feel safe in promising a feast of reason to every intelligent reader till the series is closed.

ELD. BURROUGHS' ON "OUR HOUSE."

Very few of our readers who take any interest in Nature's great laboratory, will fail to read and enjoy Eld. Burroughs' beautiful analysis of the "house we live in." It takes a highly analytical mind to write such an article, and a couple of pages of THE MICROCOSM cannot be more profitably filled than they are with this thought-provoking statement of chemical and philosophical facts and truths. Read it.

WILFORD'S MICROCOSM.

23 Park Row, New York, March, 1883.

A. WILFORD HALL, Ph.D., Editor and Prop'r.

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SPECIAL NOTICE.

In our conduct of this journal we desire to give our list of excellent contributors the widest possible latitude for the conveyance of their honest convictions, so long, at least, as this liberty does not conflict with the general aim and scope of THE MICROCOSM. But we wish our readers definitely to understand that we do not hold ourself responsible for the views of our contributors, nor, in fact, even for our own views, as we are liable at any time to change ground on receiving more light, as we have done more than once since this paper was commenced. But, generally, we hope and aim to be consistent. EDITOR.

THE SPREAD OF THE HUMAN RACE.

The political economist and statistician cannot fail to look with interest, mingled even with deep concern, upon the problem of the present rapid increase of the population of the earth, and especially of the United States. What is to become of the people of this country in a few generations when, by manifest destiny, they will fill the whole northern part of this country from the Isthmus to Alaska so compactly that by no stretch of the imagination can we see how food sufficient can be produced for their sustenance. We have always deprecated a croaking spirit that would paint exaggerated pictures of impending want and suffering, even when inexorable facts served to warrant it. We know, for example, from the scientific history of our dead and frozen moon that this earth will ultimately share a similar fate, when its lakes, and rivers, and oceans shall have disappeared, when our atmosphere shall have dwindled away, and when animal and vegetable life shall have been supplanted by a frozen and barren waste of rocky peaks, treeless valleys, and deep dried-up beds, where oceans and lakes now swarm with life. This terrible future of this green and beautiful earth is rationally taught by science and the laws of natural philosophy, and is the fearful destiny in store for our present home, unless, by miraculous interposition, a rejuvenation of the earth shall take place by divine fiat. But the scientist reasons, where he can, by natural and physical laws, resorting to supernatural influence only as the final solution of otherwise unsolvable problems. However this may be in regard to the future of our earth, it is too far away before it can sensibly be felt by the animal and vegetable kingdoms to admit of reasonable croaking from the most chronic human raven. Millions of years, at least, must intervene before the conditions of life upon this planet can materially change.

But not so with this problem of the rapid spread of the human race, and the impossibility of supplying food sufficient to sustain the millions that will crowd and jostle each other on every available part of the earth's surface. Leaving out of our present paper the broader statistical view that would contemplate the increase of the populations of other countries, we have enough to do at present to startle and even amaze the thoughtful student in looking at the near future of our own now prosperous and happy land.

At present, our people, including native-born and the immigration from all parts of the world, are not at all crowded. In fact, there is an abundance of room in the outspreading and uncultivated plains of the Southern, Western, and Northwestern regions, for many times our present population. This vast extent of domain could furnish food and shelter under proper cultivation, for hundreds of

millions of industrious people. At present, we are not only, by our infantile agriculture, feeding our own, at least, 65,000,000 inhabitants, with nearly one-half the entire population idle or non-productive consumers, but we are actually exporting food annually, according to best statistics, to supply the wants of more than 20,000,000 of Europe's hungry inhabitants, which crowd together in the densely-populated cities and villages of those countries. But this state of things cannot last more than a few decades before our supplies will all be needed at home, if we may judge by the portentous figures of the most reliable statistical tables. Let us look at these for a moment, and see if there be not cause for serious apprehension.

It is now manifest, by census figures, that the inhabitants of this country are doubling in numbers in about every twenty-five years. There is therefore no reasonable doubt but by the year A. D., 1900, the United States will contain 100,000,000 people. In 1925; 200,000,000; in 1950; 400,000,000; and by the close of the coming century, 1,600,000,000 inhabitants, all of whom will have to be fed and clothed and sheltered, by the products of the tillable land of this country, since the people of other lands will increase proportionately, prohibiting any reliance upon imports to help sustain our own dense population.

But these figures are only a bagatelle compared with those which another century and a half must inevitably pile up, and whose formidable proportions are the present source of alarm to the political economist. A hundred and fifty years more, or in less time from the present writing than we are now from the landing of the pilgrims at Plymouth Rock, and the United States alone will contain 102 400,000,000 inhabitants, or more than one hundred times the present population of the entire earth! No wonder that far-seeing statesmen of the Pacific slope, from motives of self-preservation for their children's children's posterity, wish to keep out the swarming and rapidly multiplying millions of China and other Asiatic countries!

It is manifest that such an enormous population could not be kept alive, to say nothing of living comfortably, from the most economical cultivation of every arable foot of soil in North America, if every man and woman were producers, and making no allowance for years of scarcity or failures of crops. This reasonably expected increase of population would give more than fifty persons to be supported from each and every acre of tillable land in the country, from Maine to the Pacific coast, and from the Gulf of Mexico to Hudson's Bay. The very contemplation of such figures is bewildering, and the extent of human suffering that must result from such a crowding of this continent, is simply appalling to the most unsensitive nature. We confess we cannot look at these figures without a sense of gloom, and even sadness, creeping over our thoughts. 'Tis true, inevitable death by starvation, pestilence, and internal conflicts for food, and for possession of the more comfortable places of shelter, will check to some extent this tendency to rapid increase, and at times deplete the population by sweeping off the weak and helpless to give place to the strong and hardy in the fratricidal struggle for existence. But those are among the very appalling features brought to light by these indisputable statistics. Surely the facts and figures here truthfully massed, appeal in trumpet voice to our political economists and statesmen of broad views and wide-grasping comprehension of coming events. We do not even venture a suggestion as to what, if anything, should or can be done. In the darker ages of the world, the lack of the higher civilization was itself the antidote to this rapid and permanent increase of the population. That very state of things cut off whole cities of men, women and children in promiscuous slaughter by besieging armies, and other whole cities were depopulated by the ravages of contagious diseases which now, thanks to a higher scientific knowledge, are under the control of medical treatment. Our very knowledge of the higher laws of our being, and the higher cultivation of the noble sentiment of love for offspring, which keep pace with advancing civilization, are themselves to be the two-edged sword that, in less than two hundred years, must bring about a slaughter of the innocents worse a thousand fold than that decreed by Herod. Again we ask, in view of these portentous statistics, what is to be done? Let the wise men of the land reflect and then decide.

PROF. FRENCH AND THE NEW-CHURCH REVIEW.

Last month we promised a reply to the criticisms of our new departure on sound by Prof. Thomas French, Jr., Ph.D., as published in the January number of the *New-Church Quarterly Review*. Mr. French is now Professor of Physical Science in the Urbana University, Ohio; and the fact that the proprietors of that *Quarterly* gave up to him one-half of its entire space allotted to contributions, proves that he must stand very high as a physicist. If, therefore, Prof. French has not, in his twenty-six pages of that *Quarterly*, with seven pages more added by the editor, succeeded in breaking the force of our arguments and vindicating the wave-theory, it may be safely concluded that the theory cannot be vindicated at all, and, consequently, that our arguments against it are absolutely unanswerable.

Formidable as this review of the "Problem" would seem to be from its length and from the salutatory manner in which it starts out, we say now, and the reader will also say before we are through, that an easier task than the one before

us, in demolishing everything the professor has said, turning him against himself, and proving that he himself has overthrown and abandoned the wave-theory, has never before presented itself to our pen in the numerous attacks we have been called upon to answer.

The professor, however, introduces so many points, and makes so many authoritative assertions, that it is impossible to reply to all in the space that can be used in one number of THE MICROCOSM. We will therefore carefully analyze in this number his first and leading criticism, and show how utterly impossible it is for any writer to attempt a defence of the wave-theory without hopelessly breaking it down and burying himself under its ruins.

But before entering into close quarters with the professor's criticisms, let us devote a few thoughts to the *Quarterly* itself, which has thus voluntarily become the argosy to freight such a prodigious cargo of scientific puerility into the homes of its four hundred and fifty subscribers.

We should not trouble ourself with the slightest reference to this part of the *Review* had not the chief editor (President Frank Sewall, of the aforesaid University) gone officiously and virulently out of his way to add these extra seven pages to strengthen the professor's effort in trying to disparage the work in question. But, writing in all candor and seriousness, we must say that we have seen and examined a score or more of *Quarterlies*, representing different religious denominations, and any number of monthly magazines, but a more pitiful exhibit of editorial incapacity has never fallen under our observation than is shown in this same pretentious "*New-Church Review.*" Think of a Quarterly, of eighty-four pages, containing only *three* papers (and *such* papers !), one a dry discussion of the peculiarities of the New-Church, and the views of Swedenborg (already dinned and reiterated into the ears of New-Church readers till the more progressive among them have become surfeited); the second a short article (of about two solid pages of THE MICROCOSM) borrowed and copied from an Italian journal; and the third (as large as both the others together) devoted to the ridiculous idiosyncrasies of one "Wilford Hall," in criticism of his views on the sound-theory, which the writer (Prof. French) declares to be "unscientific, untrustworthy, and *undeserving of serious attention*" (page 251), and some idea can then be formed of the editorial sterility and journalistic barrenness which pervade the sanctum of that most abortive enterprize ! One is driven to wonder what this January number of the *New-Church Quarterly* would have done for something with which to spoil several reams of excellent tinted paper if it had not been for "Wilford Hall's" vagaries ! 'Tis true it might have appropriated articles from other magazines, as it did the one from Italy, but it is doubtful, judging from this specimen, if enough editorial talent really exists in the concern even for such modest requirement. It is difficult to conceive, positively, of the poverty-stricken condition of resources which, after running a *Quarterly* for a whole year, cannot bring to its aid intellectual talent out of a hundred or more able New-Church ministers, sufficient to supply it with a respectable number of average papers on new and live topics ! Our pity for the management in such a predicament is only surpassed by our sympathy for the subscribers; and as it proposes trying to run the *Review* another year, judging from prospectus, we suggest that the editors copy *ad libitum* from the twenty or more original articles in each number of THE MICROCOSM, some contributed by New-Church writers, and thus give their few patient subscribers something worth reading.

As proof that this deprecation is not an unjust estimate, and that we have not underrated the editorial ability which unfortunately presides over the destinies of that *Quarterly*, we quote a few sentences of editorial criticism from the *Morning Light*, one of the fairest and ablest journals of that denomination, to show that very little real damage can accrue to any book, much less the *Problem of Human Life*, by attacks from such a source. The criticisms were made upon the first two issues of the *Quarterly*, and ought to have taught the managers a lesson, but it seems they cannot learn:

"If this first step shows anything of the literary pace, it will be cramped, slow, and irritating to follow. The very fact of inserting such an opening article implies so great a deficiency in that all-essential editorial gift for the conduct of an undertaking like this—width of view—that our best hope of the *Review* ever reaching that height which it might easily have touched at the outset, would lie in the direction of the editors discovering their mistake. Still, that they could have begun like this is the damaging fact, for it indicates what is to us an *irredeemable deficiency* in the conception of the highest class of work for such an end as theirs. It just shows the difference between *muddling in mediocrity* and doing the best with ease. * * * * The *Review* is, in our judgment, *respectably heavy*. There is *no originality, no force, no brightness*. The talking pace is easy-going *shambling*, and with *no consciousness of the fact*. There is not even a *suspicion of incisiveness, pungency*, or *fire in the whole of these one hundred and sixty-six pages*. This is not the varied, substantial *Quarterly* for the New-Church which we should like to see," etc., etc.

This is an all-sufficient reply to the seven pages of editorial "muddling" and "shambling" about the *Problem of Human Life*—condemning it chiefly on the ground that it did not agree with Swedenborg in certain things, and where it did happen to agree with him that it did not give him credit, etc., though the work was actually written before the author had ever read one of Swedenborg's books.

There is no question but that Swedenborg was a great and good man, and that he wrote much that was true; so with Plato, so with Socrates, so with Leibnitz, and so with Darwin. But it is equally true that wherever we happened to agree with the Swedish seer in discussing the problem of human life, the reader can rest assured that it was only a coincidence, his being entirely from a theological standpoint, while ours was purely and exclusively based upon philosophical and scientific data.

Had we been a student of, or believer in, Swedenborg, when writing the book, it is certain we never should have made our sound-departure, *for he believed and taught the wave-theory, which is one of the points which President Sewall, in his criticisms, urges against us, considering Swedenborg, as he does, infallible.* This ought to satisfy the most rabid New-Church reviewer that the book, whatever else may be said about it, has not even the smell of "*plagiarism*" upon its garments. We would rather be wrong a hundred times over in following our honest convictions, than to be a literary thief; and we simply challenge the world to point to one sentence or sentiment in the entire book that is not original with the writer, unless where due credit is given.

If any of the arguments of the book in question do really, as this critic claims, agree with Swedenborg's spiritual philosophy of a future life, New-Church journals would show better sense in thankfully accepting such scientific aid and comfort, rather than wantonly seeking to damn it by coupling it with the name of Swedenborg, which already offends the nostrils, justly or unjustly, of all evangelical denominations. This is also the opinion of several New-Church ministers of broad views, as expressed to us, and who look with sorrow and regret upon the worse than sectarian policy of such narrow-minded bigots as those controlling that *Quarterly.*

We trust these remarks will teach President Sewall, and other editorial gentlemen, *after politely sending to an author for a gratuitous copy of his book for review*, that a little decent respect is due said author, even if his views have to be dissented from.

We now come to the consideration of the criticisms of Prof. French. After his prelude of derision and sneers at a man who would attempt at a blow to overturn "*the most important philosophical teachings of modern physics,*" he proceeds to lay out his work, and concludes, quite naturally, that he "will by no means undertake to notice all the arguments by which he vauntingly claims to have utterly overthrown the wave-theory," but adds: "I am certainly doing full justice to an author, if I ask that his work shall be judged according to the merits of its avowedly strongest parts." This is quite fair, of course. He then proceeds to examine three of what he calls the author's "*tantamount* arguments," meaning, possibly, *paramount*, or something "tantamount" to that idea; so we will take him as he means, since we propose nothing but fair play with a professor who is sufficiently venturesome to attempt the prodigious feat of vindicating the wave-theory.

The three "tantamount" arguments which he selects as "avowedly the strongest parts" of our attack upon the theory are: First—The *slow motion of vibrating prongs or strings*, and the impossibility of their producing "condensations and rarefactions of the air" which will travel at the observed velocity of sound. Second—The argument based on *magazine explosions*, and the impossibility of mere *sound-pulses* breaking windows at a distance; and, Third—the "*locust argument,*" or the impossibility of an insect filling four cubic miles of air with "condensations and rarefactions" by the motion of its tiny legs; winding up with some criticisms upon the decrease of sound-intensity, according to the law of inverse squares.

1. Let us examine the motion of a tuning-fork's prongs, and exhaustively consider this one cardinal question of the wave-theory as worth volumes of mere statements or assertions about what the theory teaches or does not teach. Here, in this single pivotal question, we have something tangible from which to reach a permanent scientific conclusion, and upon which the theory confessedly stands or falls. If the prong of a tuning-fork, while audibly sounding, makes not only a *slow* motion, but a *very slow* motion, and if this can be demonstrated, then, manifestly, the wave-theory, based upon "condensations and rarefactions of the air," as all acoustical science teaches, hopelessly breaks down. We need not quote admissions to this effect from the highest authorities on sound, a score of which could be cited from the works of Tyndall, Helmholtz, and Mayer. We are fortunately spared all this trouble by Prof. French, since he himself admits flatly that the theory would break down if we can show that the prong, while sounding, makes a "*slow* motion." Let us here fortify ourself, so that no friend of Prof. French will dare even to quibble in his defense after he has fallen. We first quote from the *Quarterly Review*, page 252:

"If Mr. Hall can make good his assertion that the prongs of a tuning-fork *do not advance swiftly, then has he indeed dealt the wave-hypothesis a staggering blow.*"

But this is not all. He feels so certain of being able to show that the prong does really advance "swiftly," as Tyndall teaches, especially at the centre or swiftest portion of its swing, that he is emboldened to make this fatal admission still stronger. On page 263 he partially explains why a prong could not produce sound by air-waves if it had a slow motion, thus aiding us more liberally

to destroy the wave-theory than any critic has ever before done. He says:

"The air, being equal on all sides, opposes *no resistance to a slow motion*, because the equilibrium of the air is constantly maintained; but when the *motion is rapid, as it must be to produce sound*," etc.

Could anything be more conclusive than this admission, that in order "to *produce sound*," according to the air-wave doctrine, a "*slow motion*" will not do it? Thanks for such fatal weapons placed in our hands without even the trouble of searching for them. But even this is not all, nor the strongest thing he says in preparation for the funeral of the wave-theory. He specifically enters into details, and tells the exact distance within which a prong might travel and still not move fast enough to produce sound by air-waves. On page 257 he says:

"It is *quite true* that a velocity of *eight* inches or *sixteen* inches *would not suffice for* the generation *of sound-waves;* no physicist asserts or pretends that it would, and Mr. Hall's oft-repeated declarations to this effect are wretched misrepresentations, founded on his own lack of knowledge or ability to understand."

Now a word of digression. We never intimated that physicists teach anything of the sort, but that they teach just as Prof. French here admits, that only a "*swift*" motion will generate these atmospheric "condensations and rarefactions" which they call "sound-waves." So far were we from "misrepresentation" that we quoted both Helmholtz and Tyndall to show that they both teach, as does Prof. French, that the *motion* which produces sound, like that of a tuning-fork's prong, must pass "*swiftly*" through the air so as to *condense* the air in *front* and leave a *partial vacuum behind* it. To prove that we so quoted, see this extract from Tyndall's book (page 63), which we copied in the *Problem*, at page 91:

"Imagine the prongs of a tuning-fork *swiftly advancing;* it *compresses* the air in front of it, and when it retreats it leaves a *partial vacuum* behind, the process being repeated at every subsequent advance and retreat. The whole function of the tuning-fork is to *carve the air into these condensations and rarefactions.*"

Now, why did we quote this and similar passages from Helmholtz, if we wished to *misrepresent* the teachings of physicists, as Prof. French unkindly charges? 'Tis true, we showed that Tyndall and all other advocates of the wave-theory were mistaken. That they were entirely deceived about the prong "*swiftly* advancing," and pointed out the fact, for the first time found in any book, that this superficial appearance of "swift" motion in the prong was deceptive and, in fact, very slow motion—not exceeding sixteen inches in a second when at its full amplitude.

But now to return to Prof. French. He agrees that the aggregate travel of the prong *sixteen inches* in a second, which he admits to be correct, would not begin to produce these condensations. Hence he resorts to what he supposes to be a discovery of his own, namely, that if we take the middle of any one of the small swings of the prong it will be found to travel "immensely" swifter than the average travel during a whole swing. Yes, and then if we deduct the numerous "stops" at the ends of the swings during a second we will find that the middle or most rapid portion of the travel will be swift enough to condense the air! We have thus presented his case briefly and fairly to the reader. But it will be remarked that he does not venture to risk his cause or his reputation upon stating how much more "swiftly" the prong would actually "carve the air" after these important allowances and deductions were made. No; he prefers the latitudinarian style of "*immensely greater* than the total distance traveled"! He would have saved us some trouble had he even approximately guessed at and defined this indefinite "immensely." Had he said *twice* as fast, *four times* as fast, *ten times* as fast, or *fifty times* as fast as the average travel throughout a whole swing, or anything he would have dared to say, we would have known how to take him, and could then have wiped him and his air-waves out by a single stroke of the sponge. But he was "immensely" afraid to say anything about it, and thus left the reader "immensely" in the dark. So we must find out for ourself just how much the *middle* of the swing exceeds in swiftness the *average velocity* of a whole swing. Can we do this? Yes.

Helmholtz, as quoted from our book by Prof. French, helps us to an easy means of solution, by telling us (*Sensations of Tone*, p. 28,) that the swing of the *pendulum* is of the same nature as the swing of a tuning-fork's prong; and as we can see the proportionate rate of travel of a pendulum (especially a very long one) at all parts of its swing, we can thus determine precisely what this "immensely" of Prof. French signifies. Let any student rig a long pendulum, say thirty or forty feet long, by tying a weight to a cord and start it swinging through a short arc of, say, three feet, and we here assert, and defy any investigator to dispute it, that the swiftest portion of its swing at the middle does not exceed *twice the average velocity* of the entire swing, *while the keenest eye cannot detect any stops at all at the ends of the swings!* So much for this central and fundamental fact in regard to the swiftest velocity of travel at the centre of the prong's swing.

But we have now arrived at the *denouement* of the argument, and at the proper time for springing the trap which Prof. French had so incautiously set for himself. We had purposely baited this trap in the *Problem* by basing our criticism of Tyndall entirely upon "*sixteen* inches" as the maximum aggregate travel of the prong, each swing being a

full *sixteenth of an inch.* Prof. French took this bait greedily, and then supposed, if "*sixteen* inches" were the aggregate travel of the prong, as our bait admitted, he could still manage to make it "swift" motion by "immensely" increasing its velocity at the middle of each swing. But here the trap falls upon our hapless professor, *since the sixteenth of an inch* (maximum amplitude of the fork's swing) *is sixty times more than was necessary for us to admit,* for, by actual experiments in the presence of many students, we have shown repeatedly that the fork continues to sound audibly when its swings have become reduced down *to the one-thousandth part of an inch amplitude, or an aggregate travel of only one-quarter of an inch* in a second! How is that for "*slow*"? Thus is Prof. French caught, and there is no one to come to his aid. Even should we quadruple this aggregate motion of the prong as representing the *swiftest* part of these infinitesimal swings, it would only make the "*swiftly advancing*" of Prof. Tyndall the snail-like travel of *one inch in a second!* Or should this entire aggregate travel of one quarter of an inch in a second be increased *sixty-fold,* to represent the swifter portion of each swing, it would still fall below the velocity of "sixteen inches" in a second, which the professor positively asserts "would not suffice for the generation of sound-waves;" and that "no physicist asserts or pretends that it would"!

Will some one now try to discover the "shadow" of this boastful representative of Urbana University? We have thus put together a few of his own statements, including a few simple facts which any person can demonstrate, and the reader sees the result both to him and the theory he has so vauntingly championed.

The experiment just spoken of, by which we prove that our fork (128 vibrations to a second) will continue to sound audibly upon its resonant case when swinging to and fro but the *one thousandth* part of an inch, can be made by any student by simply reflecting a beam of light from a small mirror attached to the prong at proper angle upon a distant wall of a darkened room, and measuring the actual travel till the sound ceases. This fact, in connection with Prof. French's admission just quoted, that even "sixteen inches" could not compress the air or produce sound-waves, and that "no physicist asserts or pretends that it would," rings the funeral knell of the current theory of acoustics, while, as an epitaph upon its tombstone, we inscribe the words of Prof. French:

"*If Mr. Hall can make good his assertion that the prongs of the sounding fork do not advance swiftly, then has he indeed dealt the wave-hypothesis a staggering blow*"!

This "staggering blow" has now been dealt, and the question is, has Prof. French the moral honesty and manliness to abandon the "wave-hypothesis," and declare himself a convert to *substantialism*? If he does not do this, he can look out for breakers ahead, as we know of students in that same University who have written to us, and who are only waiting for this reply to make it very warm for the professor in his class-room.

In conclusion, for this number of THE MICROCOSM, we refer Prof. French and the Urbana University to the true law of sound-generation and propagation, as recorded on page 93 of the *Problem of Human Life,* which explains how the very slow motion of a body, such as the prong of a tuning-fork, may generate sound-pulses through molecular action by its numerous stops and starts, or sudden changes of direction. Of course, such rate of motion could not generate air-waves, as now authoritatively and conclusively settled by Prof. French himself. The final conclusion is that sound has nothing to do with the condensations and the rarefactions of the air, but must consist of corpuscular emissions of some sort of incorporeal substance as the result of molecular action. Next month we will attend to the remainder of Prof. French's criticisms, and, unless we are very much deceived, he will feel like forever cutting the acquaintance of the man who so cruelly induced him to write that review.

Now let the *New-Church Review* in its next issue print the following obituary notice for the benefit of its readers, and it will prove itself a public benefactor:

DIED: On January 1, 1883, at Urbana, Ohio, of internal weakness and general debility, our adopted child, *Wave-Theory of Sound.* For three years it has been declining in health under attacks of chills caused by the atmosphere of the *Problem of Human Life.* Several doctors have examined this patient, and while a few of them thought they could improve its condition by cupping, blistering, and exclusion from the light, a large majority of them, after a careful diagnostication, gave up the case as hopeless. As a last resort, we sought the advice and assistance of Dr. French, of the faculty of Urbana University, who was positive that the disease was only local, and that he could administer a few pills of his own discovery which would restore it to full health and activity in less than three months. We employed the doctor in good faith, and with considerable confidence, but unfortunately his first pill, instead of acting as a counter-irritant, and anti-spasmodic as he supposed, aggravated the cause of the disease, threw the patient into acoustical convulsions, brought on an attack of undulatory pneumonia, ending in a form of galloping consumption which caused the death of the child in a few minutes. We do not, however, mourn as those who have no hope, as we have a chance to adopt another child in its place, called *Substantialism,* whose robust appearance and rapid growth, though but four or five years old, indicate healthy parentage and a vigorous manhood. We take this method of exonerating Dr. French from all blame for the fatal and unexpected effect of his remedy, as we now believe that any other medicine, however skilfully administered, would have produced a similar result, since the nature of the disease, and internal condition of the patient were such

that it would not bear excitement. The funeral services will be held at the house of President Sewall, and friends of the deceased are invited without card. *Dr. Hilford Wall, Dh. P.* will deliver the funeral oration, as he was very intimate with the character of the deceased during the latter years of its existence.

College papers will please copy, and send bill to the *New-Church Review.*

CAPTAIN CARTER ON GRAVITATION.

One thing can be truthfully said about Captain Carter. He is not only always clear, but always fearless in the expression of his views. He has shown himself to be a bold friend of THE MICROCOSM in espousing the cause of its editor in his departure on the sound-theory, in opposition to established science, and deserves only kindness at our hands, even if he has entered the lists against us on gravitation. But after promising some time ago, in a letter published in this journal, that he would be more careful in the future in taking for granted "units of measure" as laid down in the infallible text-books, we find him, in his questions and arguments printed elsewhere, completely fallen from scientific grace, and not only taking for granted Newton's fundamental principle of gravitation, as the "unit of measure" now adopted by the whole scientific world, but absolutely urging the same basic principle as infallibly correct—quoting it at the head of his article, and upon the assumed truth of which he bases everything he says in his paper. Yet we propose to show in this reply, as kindly as the amusing character of the Captain's fix will permit, that a more self-evidently false, contradictory, and even preposterous law of philosophy was never penned by man than the one he has now chosen from Newton for better or for worse.

Prof. Goodenow, as shown in his "Outline of Argument" last month, must also have assumed the truth of this same underlying principle, for he speaks of the moon's attraction, as well as the pebble's, causing *one-half* of its fall, and the earth's attraction causing the other half. But he was so obscure in giving the reason for it that it was difficult to see just why he so stated. Hence, knowing what was coming from Captain Carter, we did not reply to that part of his position, but contented ourself with showing the contradictions between his two papers—one published and the other in our hands unpublished. Not so, however, with Captain Carter. He not only states the principle of Newton explicitly and correctly, but he explains its teachings lucidly. He not only indorses it as an underlying principle of the law of gravitation, but in a most masterly and logical series of argumentative questions, demonstrates that no other conclusion can be drawn from the principle than that a pebble pulls itself toward the earth by reaction, just as much as the earth pulls the pebble by direct action. There is no possible escape from Captain Carter's logic, so far as the main deduction from Newton's law is concerned. If "every particle of matter attracts every other particle in the universe," the same as a single particle would attract but one other particle if no other matter existed, as Newton's central principle teaches, then, plainly, if the pebble was one unit of matter and the earth a million units, the pebble would pull equally upon each of the million units of the earth (in proportion to distance), and by reaction thereby exert a million units of pull upon itself toward the earth, while the million units of the earth in turn would exert but one unit of pull each upon the pebble, making only a million units of pull in all, or the same, precisely, as the pebble's pull or shove of itself. Clearly, then, Captain Carter's conclusion, that "*One-half* of the total attraction between any two masses *is due to each*," and that "*One-half* of the velocity of fall in a falling body *is due to itself*," cannot be controverted, except by controverting the very principle upon which Newton's law of gravitation, and in fact the entire *Principia*, are based. In other words, if Newton's *Principia* and the science of the astronomical world, as now taught, be right, then eight feet of a pebble's fall in a second (one-half) are due to the earth's attraction of the pebble, and eight feet (the other half of its fall) are due, by reaction, to the pebble's attraction of the earth. Consequently the pebble itself does as much work in causing its own fall as does the whole earth, and hence all our arguments and those of Prof. Goodenow about the moon's shove of itself toward the earth *one-eightieth* as much as the earth pulls it, are simply *moon*-shine, or something less dense, and the famous "boat-illustration" in which the professor so fluently and fatally agreed with THE MICROCOSM, falls to the ground. Let us now examine carefully into the matter, and see whether THE MICROCOSM and *Prof. Goodenow* (in his unpublished article still in our possession) shall be compelled ingloriously to surrender and haul down their colors, or whether the *Principia*, as Dr. Swander has it, shall be "closed for repairs."

If this principle be correct, upon which the gravitation law is based, then it is plain, if the earth were deprived of its entire reciprocal attraction, that the pebble would still fall eight feet in a second by its own almost infinitesimal attraction of the earth. Is this true? Is it reasonable? We frankly say we do not believe a word of it. To be explicit, we do not believe that there is a particle of truth in the principle of gravity, as quoted from Newton at the head of Captain Carter's article. We do not begin to believe that a pebble would attract *each* of a million similar pebbles, at a given distance, with the same force that it would attract but one,

if there were no other matter in existence to be attracted. The very idea, to our mind, is preposterous on its face, and is contrary to every known or conceivable principle of mechanical power or dynamic force. Yet it is the foundation of Newton's *Principia*. As well talk about a locomotive pulling, by its inherent power of one hundred pounds of steam, a *million cars*, exerting the same force upon each with which it can pull at one! Neither do we begin to believe that this earth could pull at each of two such earths at a given distance with the same force that it could pull at only one; much less do we believe that it could pull at each of a million such earths with equal and undiminished force. In sober earnest we conceive such an idea, when duly reflected upon and analyzed, as the quintessence of absurdity and nonsense, and we propose to make it so appear to the reader by unanswerable arguments. We propose, also, to prove that this earth would of necessity exhaust or consume a portion of its attractive energy in pulling at another earth of equal mass, such consumption of force being in proportion to the distance of the two earths apart; and that this weakening of attractive force would necessarily occur in proportion to the number of earths attracted, the force of this one earth being divided up among them. Of course, on this principle, our earth's attraction would be proportionally weakened by drawing at smaller masses falling toward its surface; but all terrestrial masses combined would constitute such an inappreciable trifle, compared to the earth's mass, that their effect in lessening the earth's attraction could scarcely be computed, and would not be worth considering in a general estimate.

Let us now proceed to prove our position against the combined conclusions of the scientific world, by the only analogy to gravitation existing in Nature or within the reach of human experimentation, that is, by the reciprocal attraction of magnets, which have been aptly compared to miniature planets. It is well known to the most superficial experimenter that two steel magnets, of equal mass and magnetic strength, will exhaust a portion of their attractive force in pulling at each other, and that one such magnet cannot pull at each of two magnets, at a given distance, with the same force that it can pull at one; much less could a single magnet pull at each of a dozen, at equal distance, with the same amount of dynamic energy as at one, but would divide its attractive force up among the dozen, giving nearly one-twelfth of its normal attracting force, at that distance, to each.

This fact cannot be made so easily manifest by experimenting with two or more magnets, as with one magnet and several equal masses of soft iron, which, of course, have no reciprocal attraction. To demonstrate the truth of the principle here urged, take a steel magnet, and hang to its poles an equal mass of soft iron, with a thin card between it and the magnetic poles to prevent actual contact. Suppose, now, the strength of the magnet to be such that it will barely keep this weight from falling. Then, to test Newton's principle of the *inexhaustibility* of attraction, bring another piece of iron gradually into close proximity to the magnet, and instantly this source of attractive energy yields up a part of its dynamic force to the approaching iron, and lets the suspended piece drop! Bring two such pieces of iron toward the magnet, one on either side, and it will drop the suspended piece with less approach than before, as it now has three masses among which to divide up and parcel out its pulling energy, just as three earths (having no reciprocal attraction), approaching this earth, would consume and divide up our earth's attraction among them, gradually lessening the weight of all terrestrial bodies on the earth's surface, until the actual contact of the four globes, when dynamic action would cease between them, and the four earths would combine, under static pressure, into one great earth with about fourfold the attracting power of one.

Any person having a common horse-shoe magnet and a few pieces of iron, can try this experiment, and thus overturn the *Principia* and the science of modern astronomy with the only attractionin Nature subject to man's manipulation. No man can deny this to be a perfect analogy to the attraction of gravitation, so far, at least, as the dividing up of the force and its proportional exhaustion is concerned; and a school-boy can thus overthrow Newton's basic principle of gravity, and defy his teacher to show, by any analogy or principle in Nature or mechanics, the least sense or true philosophy in the vaunted law upon which the astronomical science of the world now rests.

We furthermore do not believe that Newton saw, or even guessed, the consequences of his fundamental principle of gravity as it has been stated and legitimately carried out by Captain Carter. He would no doubt have laughed at a man who would have insisted that a pebble, according to his law, only falls eight feet in a second by virtue of the earth's attraction, and that eight feet of the fall must be due to the pebble's own attraction of the earth! Why would he have laughed? Because Newton repeatedly tells us that this sixteen feet fall of a stone in a second is the *measure of the earth's attraction of the stone*—not of the stone's attraction of itself toward the earth! Prof. Goodenow summarises Newton's demonstration in the same way as given in his articles published in THE MICROCOSM, calling the sixteen feet fall of a stone the "real, true yard-stick" and the *true measure of the earth's attraction*, by which Newton determined its pull upon the moon in drawing it from its tangent—not one-half of it *the moon's pull upon the earth*, of course! Even Prof. Robinson, in his great *University Astronomy*,

from which Captain Carter quotes (a standard work, by the way, in all colleges), teaches the same doctrine. He says:

"Now, we say, this sixteen and a twelfth feet is the *measure of the earth's attraction* at its surface, and it is made the *unit and standard measure, directly or indirectly, for all astronomical forces*" (page 171).

Thus it seems that it never occurred, either to Newton or to Robinson, that the falling stone did *one-half*, or any appreciable part, of its own work of falling, but they manifestly supposed and taught that the "earth's attraction" did it all.

Clearly, then, Captain Carter misunderstands Prof. Robinson, for Prof. Goodenow, in the unpublished article in our hands, refers to the same passage in Robinson's Astronomy, quoted by the captain, to prove that we had charged Newton and the astronomers falsely, because Robinson, he says, made this very allowance of one-eightieth for the moon's displacement of itself, in addition to the earth's pull! Prof. Goodenow repeats it over and over, that we had misrepresented astronomers, that they do add just what we charge them with omitting, and before quoting from Robinson he emphasizes it thus:

"It is very strange that such a *charge* should be made of gross oversight of a law on the part of astronomers [He surely knew what our charge was], *when they have all taken pains to commence their demonstrations with a rigid enforcement of this very law of reaction*, * * * * and especially when their works *universally contain the full and clear calculation and adding in of this very eightieth part extra* (*rather 75th part*), *which it is alleged they have overlooked and omitted.*"

He then quotes the very section from Robinson's Astronomy (which Captain Carter quotes) to prove that the charge of omission *which we had made* was false. Now it turns out that our charge was actually true, and that the moon, instead of adding *one-eightieth* to its fall, actually adds one-half, while the earth adds the other half, and poor Prof. Robinson is compelled to take both sides of the question!

Of course, we dare not doubt the word of this high authority, that the sixteen feet fall of a stone by "*the earth's attraction*" is really made the "unit and standard measure" of all astronomical calculations, and especially for estimating the earth's force as exerted upon other parts of the solar system! Hence we accept this authoritative confession from Prof. Robinson, that either Newton's great principle of gravity is entirely erroneous, as we have just demonstrated by the magnet, *or else that all astronomers commit an error of just one-half in calculating the earth's influence in the solar system!* There is no escape from this, because Captain Carter has shown, as clear as mathematics can make it, that this "unit and standard" of sixteen feet is just twice as large as it should be to cover "*the measure* of the earth's attraction" alone!

But another view of the difficulty, just here. If Professors Robinson, Goodenow, and even Newton, are correct about the sixteen feet fall of a stone being the "*standard unit measure* of the *earth's attraction*," or the "real, true yard-stick" for determining the earth's influence upon the moon and planets, then, clearly, science is all wrong about the amount of descent of a falling stone in one second. It must be thirty-two feet instead of sixteen; for Captain Carter has demonstrated that the stone must fall, according to Newton's great law, by its own *measure of attraction* just as much as by the *earth's measure*; and as all these authorities agree that sixteen feet constitute the "*earth's* measure of attraction," it leaves sixteen feet, or just one-half of the stone's actual fall in a second, unaccounted for! We suggest, then, that the Military Academy at Chester, Pa., start a commission of scientists in search of this lost factor in measuring the forces of the solar system, and thus correct the astronomical text-books by making the stone's fall in a second thirty-two feet, as it should be, instead of sixteen; for we surely want the "standard unit measure" of the stone's attraction, as well as that of the earth! And we take the liberty of naming our handsome contributor, Captain Carter, as the right man to lead the expedition in search of this "missing-link" of Newton's law!

But in the numerous questions propounded by the Captain, he suggests certain difficulties aimed to sustain Newton's great principle of gravity, showing plainly that he has fully committed himself to the law, and that in so doing he forgot to maintain his promised caution in looking out for *false units of measure!* We can only regret that he is ready to go down with the author of the *Principia* in the same scuttled ship, since we had learned to love him for his work's sake. Let us see what force there is in his suggested difficulties. If the earth should expend its attracting force in drawing another earth in close proximity, men and animals, the Captain thinks, ought to weigh nothing, and should be able to "step off into space"! But why make the supposition unnecessarily extreme? The earth would not exhaust all its force in pulling at another earth in close proximity, nor entirely if several earths were attracted, but more and more as the number and nearness of these masses were increased. This is precisely the way the magnet acts. When several equal masses are brought near it, and its attractive pull is almost exhausted and divided up among them, iron filings in closer proximity will still cling to the magnet with force enough to prevent their "stepping off into space"! If a dozen earths were approaching this, and its attractive force were nearly exhausted among them, men and animals would still have weight enough left (having precedence by contiguity) to keep them on *terra firma*, though such

a bagatelle of the earth's attraction would, of course, be deducted from the aggregate pull upon the more distant approaching earths, the same as in the case of the iron filings which cling to the magnet. Could not our logical Captain have seen this?

But he manifestly knows nothing at all by experiment about the effect of such an approaching mass in using up the gravity of the earth, and can know nothing only as he may learn from the action of the only other principle of attraction existing in Nature, and that, of course, as he will now see, is directly against him. Hence, rather than look at the matter in this rational light (or possibly he did not think of it) he prefers to do a heap of guessing and assuming about "stepping off into space," just because Newton announced a most unreasonable law, and because astronomers have, so far, been unable to detect its weakness. Consequently the Captain writes confidently about this earth's unlimited resources of gravital energy in attracting millions of earths without the slightest diminution of its dynamic force, when he could have upset the whole thing with a fifty-cent horse-shoe magnet and a pound of tenpenny nails.

He further thinks that if two equal earths were to come entirely together that they ought then completely to use up each other's attraction if Newton's principle of gravity be not true; and further, he thinks that if we deny this principle then we must admit that the two hemispheres of our earth, resting together as they do at the equator, ought entirely to exhaust each other's gravital force, and let a man at the north pole "walk off anyhow"! But he forgets again that there is no *dynamic* force of the earth's attraction expended after the two supposed earth's should thus come to rest in static contact, nor in the two hemispheres of our earth thus resting together as he supposes; but in each case the static mass becomes doubled and goes to work dynamically on external bodies with a doubled attractive force. This is clearly shown also in the case of two magnets which though they consume much of their force in pulling upon each other, yet the moment they are placed in actual contact with their poles in proper direction, they cease consuming each other's dynamic force, but combine in constituting one magnet of about double the attractive energy of the single one, in drawing all external bodies of iron. How plain are the laws and phenomena of Nature when self-interpreted!

We thus solve every problem and answer every difficulty presented by Captain Carter, by simple reference to the magnet as the sole analogy in Nature which can give us light upon the subject. We thus demonstrate our former position to be true to the letter, that all falling bodies add to their velocity of descent by virtue of their own attraction of the earth in proportion to their respective masses. That is to say, a stone one millionth of the earth's mass causes only one-millionth of its gravital fall, while the earth's attraction causes the rest. So the moon being one-eightieth of the earth's mass would cause about one-eightieth of its fall if let drop, while the earth would cause about seventy-nine eightieths. How plain this is after Newton's erroneous principle is put out of the way! And how clearly it demonstrates the fallacy of the universal teaching of science that a feather and a cannon ball *in vacuo* must fall with the same velocity! And how conclusively does it overturn the *Principia* in its universally accepted declaration that the moon and a pebble let fall from equal heights "would describe equal spaces in equal times"!

And, as a final conclusion, if our reasoning be correct, and if this cardinal principle of gravity has broken down, it has brought utter and irretrievable disaster to the *Principia* itself, since every calculation, diagram, or demonstration in it is based upon this very pivotal principle of gravity, as quoted and applied by Captain Carter.

We will add, in conclusion, that we are intensely grateful to Captain Carter for his excellent aid in this logical *reductio ad absurdum* of Newton's great law. He was not aware, however, that by demonstrating, as he has done, the real effects of Newton's central principle of gravity, he was putting into the hands of THE MICROCOSM another mallet with which to shiver the "real, true yard-stick." Thanks.

Having now answered all comers, except those who merely repeat old arguments, we shall consider the case closed and give it to the jury.

ROMANCE OF THE "PROBLEM."

If our readers could have the secret history of the rise and progress of the *Problem of Human Life*, they would possess a scientific and literary romance founded on fact worth reading. Our thoughts are made to revert to this theme by an article which appears in this number of the MICROCOSM from a very dear friend of us and our work, and which awakens feelings which no pen can paint. We will name only one pertinent incident in the history of the book at this time.

When the Ms. of the "Problem" was finished, we were without a dollar, in this strange city—knowing not one publisher here or in the United States, and having no literary friend or acquaintance to introduce us. Almost without hope of success, we went to the Appletons, Harpers, Scribners, and several other houses, and showed them our Ms. and explained it briefly as best we could. But it received only smiles of derision, or looks of surprise, as one would expect to see on going to a stranger and asking him to aid in the construction of a perpetual-motion or flying-machine. An incredulous shake of the head, as the Ms. was returned to our hand, was the uniform termination to these fruitless interviews. One house only consented to print 500 copies of the book on condition that we would produce a set of electrotype plates at our own expense. This we

refused to do, because, first, we had no means, and second, we were unwilling, if we had, to tie up the future of the work upon such a meager offer, since the house named would only do as proposed on condition of receiving the exclusive control of copyright, paying us a royalty of ten cents a copy.

Disheartened with the prospects, we retired to our room at Smith & McNell's Hotel, to reflect upon the sad fate that seemed to stare the poor author and his work in the face. We confess that at this time, we confidently expected never to see the book in print, and that whatever our hopes had been of benefiting the world by our years of toil in preparing the Ms., we were now forced to conclude that no one would ever be the wiser for our labor. * * * * * *

By the merest chance, as it seemed to us (though we can now see the hand of Providence in it), we became acquainted with a young man—an avowed *atheist*, but a jolly, good-hearted fellow—who became interested in our discoveries. Suffice it to say, that through him we obtained means to get out the electrotype plates and issue a thousand copies of the book, not knowing, however, that we would ever sell a dozen copies, but desperately hopeful, and intensely encouraged by our good fortune in meeting a liberal-minded man, even though he "said in his heart there is no God."

As soon as the first books were bound, we rented a cheap office at 234 Broadway, and placed a hundred copies of the book on a shelf. But knowing nothing of the trade here or elsewhere, we saw very little means even now of starting the sale. The book was shown to a scientific writer, who happened to be pleased with it, and who volunteered to write a review of it for a paper then just starting, in which he had an interest. This he did, and it was a noble review, ringing with commendation. A few days after the first number of this paper was sent out (not a copy of the book having yet been sold), we received a letter from the great publishing house of J. B. Lippincott & Co., of Philadelphia, requesting us to send them a copy of the *Problem of Human Life* with bill. On opening the letter, we scanned the order with astonished delight, and made haste to start the book on its mission by express, without delay. Two days after, we wrote Lippincott & Co., asking them to tell us who had ordered the book, and were informed that it was the Rev. L. W. Bates, D.D., of Lynchburg, Va., the very man whose *Open Letter* to Dr. E. is printed elsewhere in this present number!

A few days later we received another order with the money inclosed from Prof. I. L. Kephart, A.M., Lebanon, Pa., whose articles on various themes have appeared in the MICROCOSM, without missing a number since its commencement. These names head the roll of honor as the first two purchasers of the "Problem," and none will ever know how dear those names are to this author's memory.

A week after selling the first copy, we received a letter from the editor of the *Methodist Recorder*, of Pittsburgh, Pa., asking us to send him a copy for review, saying that the book had been strongly recommended to him by Dr. Bates, who had been reading a copy with "intense delight," quoting also several sentences from the Doctor's enthusiastic letter. He then added in postscript, "You can quote this if you like, as it is very high authority, Dr. Bates being the *President* of the *Methodist Protestant Church of America*, and consequently, the highest officer in that denomination."

Of course we sent the book as requested, which the editor gave to the Rev. J. J. Smith, D.D., our excellent contributor, now at Haverstraw, N. Y., whose two lengthy and enthusiastic articles in subsequent numbers of the *Recorder* about the book, gave it the first real impetus it had received.

It was but a few days after sending the copy of the book to the *Recorder* office, when we received the *Methodist Protestant*, of Baltimore, containing that memorable article written and signed by Dr. Bates, beginning:

"This is the book of the age, and its unknown author need aspire to no greater literary immortality than the production of this work will give him; and thousands of the best educated minds, that have been appalled by the philosophical teachings of modern scientists, will rise up and call him blessed," etc.

From the *Open Letter* in this issue, it seems the Doctor has not, during all these years, weakened in his faith in the book, nor in his love for its author. God bless him.

And now, after more than 40,000 copies of the work have been sold, without one dollars' worth of newspaper advertising—simply by one man, after reading it, telling another—we look back to the sale of the first two copies herein narrated, as the proudest and happiest day of our life. And what makes this happiness keener, is the consciousness that the purchasers of those two books have never swerved to the right or the left a hair's breadth amid all adverse criticisms, in their faith in the general correctness of the positions and new departures of *The Problem of Human Life*.

REPRINT OF VOLUME I.

We have waited till the present before coming to a final decision to reprint Vol. I. of the MICROCOSM in book-form, bound in cloth, of uniform size with the present volume, to be sent by mail at $1 per copy, as originally proposed. There have not enough of our subscribers yet signified their intention of taking copies to warrant the expense of reproducing the volume and issuing an edition; but the enthusiasm of several hundreds of our readers upon the subject, has induced us to say now, that we will proceed at once to the work of resetting and electrotyping the pages, preparatory to issuing the first edition of 2,000 copies; and that we will prosecute the work as fast as we can in the midst of our other extended and laborious duties. Every page of the reprinted volume must cerefully pass under our own eye for revision, and the whole will appear in uniform type, *leaded*, to make it as readable as possible. This will, of course, take some months, and we will keep the readers of the MICROCOSM advised as the work progresses. Names can now be forwarded for one or more copies as the liberality of its friends may dictate. If any can and will remit the price in advance, it will aid the cause, and help the Editor in his irrepressible conflict. We give below a single specimen of the encouraging letters we are receiving from our subscribers on this subject:

A. WILFORD HALL, PH. D.,

Editor of the MICROCOSM: I remark that of late you say nothing about reprinting the invaluable first volume of your journal bound in cloth, at $1 by mail, as formerly proposed. I sincerely hope you have not been forced to abandon it for want of sufficient pledges from subscribers to take copies. I consider the loss of the first volume, in preservable form, to accompany the present and future volumes, an irreparable loss to advanced students of science and philosophy. You can put me down

for twenty-five copies at $1 each, and I will see that they are put where they will do the most good; and to aid you in the work of bringing it out, I inclose $5 on account of my order. Yours very truly, H. S. SCHELL.

New York, Feb. 23, 1883.

We would say in conclusion, as the wood cut portrait of the editor in the first number of Vol. 2, is so very poor a representation of his real appearance, that we will put the steel plate engraving, now used in *Universalism Against Itself*, also in the first volume of MICROCOSM as a frontispiece. This will add to its cost if not to its value. All friends desiring to see that volume circulated in permanent form will now aid us what they can, while we lose no time in getting it out.

TEACHERS FALLING INTO LINE.

From various parts of the country we are receiving proofs, in letters from professors and teachers, that the wave-theory of sound is gradually giving way before the attacks made upon it in the *Problem of Human Life*. We could print a score of letters recently received from teachers who are falling into line for the final conflict. We may not live to see the close of this war, but many of these young men will, and many of them will no doubt look back upon the past as a matter of curious memory, when men, who were regarded as learned in natural philosophy, actually taught the wave-theory of sound for scientific truth! We add but one specimen of these letters now, from Prof. R. M. Bridges, A.M., Principal of the High School at York, Nebraska, who concludes his letter as follows:

"I wish I had a copy of the *Problem* that was as faultless in typography as I am sure it is in theory. Such a book deserves to be printed in the highest style known to the art. I teach your theory of sound in the High School here, and have done so since April last. A number of minor experiments have been inaugurated, which have thoroughly satisfied me and my classes that the wave-theory is not only *wrong*, but that what you offer as a substitute is *right*. My object in writing you this note is to try in some humble way to give you what aid I can. "Yours, very sincerely,

"R. M. BRIDGES."

THE EDITOR'S PHOTOGRAPHS.

We have tried our best to keep even with new subscribers in sending the promised memento of the editor's photograph, but we have failed to keep anywhere near up to the increasing list. We have, therefore, decided to send, in place of the photograph, a copy of the exquisite steel plate engraving of the editor, cabinet size, which the artist, Mr. Tiers, declares to be far superior, both as a likeness and a work of art, to the photograph. In this way the thousand or more orders now behind will be immediately filled. We trust this arrangement will be satisfactory, and feel sure it will.

HALL & CO., *Publishers.*

TO OUR CORRESPONDENTS.

We feel sure that many of our very kind friends at a distance think we are treating them shabbily in not answering private letters, which come to us by the score almost daily. We take this public means of saying privately that our neglect does not arise from any want of the most kindly feeling on our part, but from a crush of duties connected with this magazine and our other publications, which has absolutely prevented our enjoying a day's vacation, or even a single holiday, for more than five years. We write (and read upon investigations for immediate use) every night till ten o'clock, and are up and at it again by seven o'clock every morning. Thus we have no time for private correspondence, and though always pleased to receive letters from our hosts of friends, they must not let the thought of neglect or indifference on our part enter their minds. As this brief statement answers a thousand or more good letters, we know our readers will not grudge the room it takes.

BACK NUMBERS OF PRESENT VOLUME.

No new subscriber should think of cutting this volume in two and taking one-half of it. He might almost as well subscribe for half of a dictionary! The papers of contributors and the editorials are so consecutive and interlaced from number to number, that the volume should be taken entire by every subscriber. Agents will please make a note of this. All premiums for clubs are on the ground of subscribers taking the volume from the commencement.

REV. DR. SWANDER,

Our able contributor, whose discriminating article on *Newton and the Principia* will be found in this number, and whose incisive papers are so eagerly read and highly praised by our subscribers, is about to move from Tiffin to Fremont, Ohio, where his hosts of warm friends have secured his services as pastor, and where he will hereafter be addressed.

A BEAUTIFUL OIL PAINTING.

We had the pleasure of seeing the other day at the rooms of Fowler & Wells, publishers, a painting by Mr. Tiers, the artist, of a family group of eight persons, life size, which is certainly the finest work of art of the kind we have ever examined. It represents the family of Col. William Denny, of Winchester Va., who commends the work highly, both as an art-production and an excellent group of likenesses. The reasonable terms on which this artist executes family groups or single portraits, make it convenient for persons of taste to decorate their homes with these fine mementoes without the necessity of expending the extravagant sums usually demanded by artists of his class. Orders can be sent through THE MICROCOSM.

JUDGE POSTON ON UNIVERSALISM.

Next month we will give from the pen of Judge O. S. Poston, of Harrodsburg, Ky., his reasons for believing in Universal Salvation. Some time since the Judge wrote to us inquiring if we would be willing to let our readers have the privilege of seeing those reasons. We replied that we certainly had no objections, and requested him to make them as strong as possible. He has done so, of course, and the paper is an elegantly written document, as might have been expected from such a source. The Judge's reasons for believing in the doctrine will be accompanied by our reply. We will only add here that it is plain from reading the article that Judge Poston has never seen *Universalism Against Itself*.

PROF. J. A. GRAY ON NEWTON.

It is positively laughable to witness the ludicrous manner in which THE MICROCOSM has got the scientists by the ears on the subject of gravitation. Since our discussion commenced, the whole question of Newton's teachings, as viewed by eminent professors, has turned into an inextricable jumble of contradictory explanations of the fundamental law. Prof. Goodenow first agreed with us that the moon must really pull itself by reaction toward the earth one-eightieth as much as the earth pulls it, or in proportion to mass, though he finally changed his ground and concluded by "the *peculiar* nature of gravity" that the moon would pull itself "*one-half*," if let drop, while the earth would cause the other half of its fall! Captain Carter proceeds to demonstrate as printed elsewhere, that Goodenow's revised view is right, according to Newton's first principle of gravity, which he quotes and indorses. Prof. Kemper says the moon adds to its fall by pulling at the earth just as much as the earth would add to said fall if the moon's mass were added to the earth, and therefore that a pebble's mass added to the earth would cause the pebble to fall with the same velocity as the moon, that is, of course, one-eightieth faster (Newton and Goodenow revised)!

"Now, J. A. Gray, Professor of Mathematics in Muskingum (Ohio) College comes forward with an entirely different theory of action and reaction, contradicts all the professors, as well as Newton, denies that the moon attracts itself at all toward the earth, and thus makes an indescribable muss generally in the scientific camp, upsetting every thing in his way. Here is his startling discovery as explained in the *Eastern Ohio Teacher*, published at Cambridge, O:

"It seems that this theory of Hall's, that the moon pulls itself by pulling at the earth, is admitted as a fact by both Prof. Kemper, of Bethany College, and Prof. S. B. Goodenow.

"By this admission, Wilford has really, in my opinion, obtained the advantage over Prof. Kemper in the January MICROCOSM.

"Now I beg leave to say that if even Hall's theory in this respect be true, it don't affect Newton's law that the earth attracts other bodies with a force which varies inversely as the square of their distance from the centre. This law which Hall has denied is not concerned with the moon's pull, but with the earth's pull.

"But I beg leave to differ with the learned professors named above, and deny that the moon actually pulls itself by pulling at the earth.

"Does not the moon send out its mysterious rays of gravity in all directions? Is it not always exerting its force as much in a direction opposite to the earth as towards the earth? Then if exerting this force towards the earth tends to pull itself in that direction, the force sent out in the opposite direction would have an opposite tendency, and one would balance the other."

Well, the gravitation controversy must now be considered closed! Prof. Gray has really gone and done it! The moon pulls by cords of gravity attached to the earth, but does not by reaction pull itself toward the earth at all, because, forsooth, it has other cords of gravity extending out into space, in the opposite direction which are not attached to anything, and consequently by pulling at nothing the moon counterbalances its pull at the earth! This mathematical genius thus holds that two men in a boat, one pulling at a rope on one side attached to the shore, and the other on the opposite side, *pulling at a loose rope attached to nothing*, would "balance" each other, and thus let the boat stand still! Let Prof. Gray now have the belt; Muskingum has carried off the prize from Bethany! Where is Prof. Hornung and Heidelberg College?

PROF. STRONG IN ZION'S HERALD

"It never rains but it pours." Almost simultaneously several professors of physics have recently, as if by conspiracy, assailed the sound departure of the *Problem of Human Life*, publishing lengthy articles in different papers of the country against the author's positions. Some of these attacks are too trivial to merit reply, and others are in papers too obscure to require it. The attack by Prof. W. C. Strong in *Zion's Herald*, of Boston, merits a reply from us, not on account of the force of the arguments employed, but because of the character and wide circulation of the journal in which the articles appeared. No sooner were his two papers printed than we were besieged by letters from Methodist ministers in different parts of New England, who take THE MICROCOSM, urging us to reply to the professor's bitter assault, and, if possible, have our reply published in the same journal. Accordingly, we wrote to the Rev. Dr. Peirce, Editor of *Zion's Herald*, asking permission to reply through his columns. The doctor politely answered us, offering the desired space. We have sent on our reply in two articles of about the same length as the professor's, or less than two pages of THE MICROCOSM, each, and as the points of the argument involved in our discussion are different from those in reply to Prof. French, though equally important, we propose, at the request of many subscribers, to print these articles in two consecutive numbers of THE MICROCOSM, beginning next month. We promise our readers as complete an overturn to the main points of Prof. Strong's assault as that in reply to Prof French, printed elsewhere. So look out for a conspicuous tumble for New England's daring champion.

AN EXTRAORDINARY OFFER.

Any person who will send us the names of *two new subscribers* for the present volume of THE MICROCOSM *from the commencement*, with the money ($2), will receive credit for the next volume as a premium. Persons sending names under this offer should intimate it, that due credits may be given. A few minutes' effort, by almost any subscriber, among his friends, could accomplish this result; and, of course, the sooner the effort is made the easier the names can be secured. A pastor, especially, who wishes THE MICROCOSM to be read by his people, could, with a few words, induce a couple of the thinking members of his congregation to take it. Who will start out, on reading this offer, and thus secure the next volume free while aiding the spread of useful reading matter? Remit money in post-offic orders or bank drafts on New York, when convenient, as an absolutely safe way. If this is not convenient, send in registered letters. Address, Hall & Co., Publishers, 23 Park Row, New York.

P. S. If any new subscribers prefer to take the last half of this volume (beginning with February number) and the first half of Vol. 3, they are at liberty to do so. Where no preference is stated, we will send this volume from the commencemen.

WILFORD'S MICROCOSM.

Vol. II.—No. 9. NEW YORK, APRIL, 1883. {One Dollar a Year. Single Copy 10 cts.

THOUGHTS RESPECTING THE ETERNAL I AM.—No. 1.

BY REV. T. WILLISTON, M.A.

Since adoration of the Most High will manifestly constitute much of what is done and enjoyed in heaven, and since in order to adore Him there, it is important that we have right conceptions of Him and His attributes while we are here, I crave the privilege of showing what *my* conceptions of Him are, hoping that they will be found to accord with the sacred oracles. Claiming no sway over other men's opinions or consciences, I would simply be allowed, like Elihu of old, "to show you mine opinion."

That some *one* thing, and only one, has eternally existed, and that an infinite Mind, or the very God of the Bible, is that one thing, are truths which even Reason demonstrates. It is her testimony that if *more* than one thing has always existed, then there is more than one uncaused, independent, and all powerful thing existing; in other words, there is more than one God. But it is highly irrational to suppose that there may be two or more eternal and omnipotent things, or beings, each independent of his co-equals; and the two volumes of Nature and Inspiration unite in declaring that there is but one God. In worshipping one eternal Being denominated God, we are all of one mind; but there are some, we regret to say, that can not join with us and the Bible in adoring a *triune* God, Father, Son, and Holy Ghost. Well, however mysterious the triunity of the Divine Being may seem, is it a whit more so than man's threefold nature as expressed in these inspired words—"I pray God your whole spirit and soul and body be preserved blameless unto the coming of our Lord Jesus Christ?" Spirit, soul, body, constitute only one individual.

Is there any limit to the *power* of that Being whom we all unite in pronouncing Almighty? I fully agree with those who say that His omnipotence don't enable Him to do things which are in their own nature impossible; to make a triangle, for instance, to have less or more than three sides and three angles, so long as it remains a triangle. To say that He cannot do such things, is by no means any limitation of God's infinite power. But I differ widely from those who maintain, as some do, that God was *unable* to create the world *out of nothing*, and that the very idea of His doing it is "unthinkable" and absurd. Since the non-eternity of matter can be demonstrated, and since the omnipresence of God—as I expect to show shortly—is not what some writers represent it to be, I see not how He could have, at hand, any material out of which to create a world, unless mere space be counted a material. Is the idea of *creation out of nothing* a whit more "unthinkable," or difficult of comprehension, than how God could be without any beginning, or than how "by the word of the Lord the heavens were made, and all the host of them by the breath of His mouth?" Will any one venture the assertion that if the "six waterpots" which, at Christ's bidding, were filled with water, had instead of that been exhausted of air and made wholly vacant, He could not, with perfect ease, have filled them with wine? Would it have been a higher proof of His omnipotence if Jesus had made wine out of nothing, than it was for Him to convert water into wine by a mere act of His will? He that could speak a world into being, and work such stupendous miracles as the Bible records, could he not, with equal ease, create matter and all things else out of nothing? Has the Supreme Being any *visible form?* To decide this question, we will appeal, first to reason, and then to revelation. Is it *rational* to believe that the Infinite Mind, unlike all created and finite minds, occupies no visible medium or form, and has no tenement other than infinite space? For one, I know of no idea which to me seems to be more irrational. Indeed, it is hardly possible to conceive of a mind, whether finite or infinite, that dwells in no tenement whatever, and that has no organs of vision, speech, or hearing. If the words *mind* and *thought* are synonymous, or if *an intellect* is but an invisible point, and needs no form to dwell in, no visual, vocal, or auditory organs, then, for aught we can see, myriads of intellects might co exist within a single cubic inch of space. Convince me that the Infinite Mind dwells in no form whatever, and I will convince you that no created minds occupy forms or visible tenements, and that there will be no such thing as personal recognition in the world to come. Yea, more, I will convince you that the pure in heart shall not "see God," but that the worship of heaven will consist in the unspoken, inaudible, and purely *mental* communion of countless *unseen intellects* with each other, and with the great Unseen! If I could believe, as some seem to, that all souls or spirits, not excepting God, are and ever will be devoid of form, organs, and visibility, I am almost ready to confess that heaven would seem rather a dull (gloomy?) place to me!

Does the Bible talk as though the "Father of spirits" has no form? Of Christ it is said, "Who, being in the *form* of God, thought it not robbery to be equal with God;" and Cruden says that in this passage "form is taken for *shape.*" And when John says, "Ye have neither heard His voice at any time, nor seen His *shape*," is it not implied that, though they had not seen it, God *has* some sort of shape or form? Said Jacob at Peniel, "I have seen God face to face." In the 24th of Exodus, we learn that no less than seventy-four persons "saw the God of Israel, and there was under His feet as it were a paved work of a sapphire stone." Says Isaiah, "Woe is me, . . . for mine eyes have seen the King, the Lord of Hosts." Of Moses the Lord said, "With him will I speak mouth to mouth . . . . and the similitude of the Lord shall he behold." It is true, however, that to this same Moses God at one time said, "Thou canst not see my face, for there shall no man see Me, and live." How reconcile this last quotation with the passages before quoted? (See Ex. 33:xx–xxiii) God would allow Moses, it seems, to see His "back parts," to have a shadowy glimpse of His resplendent and glorious person; but a full, unobstructed view was more than he could *then* endure. When, therefore, it is said of God, "Whom no man hath seen, nor *can* see," the meaning is that no mere mortal has ever seen Him in all the overpowering splendor of His per-

son and aspect. Yet Moses and some others have been allowed to "behold the *similitude* of the Lord, and with undimmed vision, no doubt, will "the pure in heart" be suffered to "*see* God" as He is. Is God *personally* omnipresent? Varying the language, does He fill infinite space with Himself or with His presence, just as air fills a room, or water a cistern? It seems to be the opinion of very many that He does. And to prove it true, such words as these are cited: "Do not I fill heaven and earth? saith the Lord." And after asking, "Whither shall I flee from Thy presence?" the Psalmist goes on to say, that go wherever he might—to heaven or to Hades, or to "the uttermost parts of the sea"—Jehovah would be there. How harmonize these inspired words, perhaps you ask, with the idea that, *as a Person*, God is *not* every where present? If He is not personally ubiquitous, how is it true that He fills heaven and earth?" He fills them, I reply, with His all-pervading inspection and control. In His infinite knowledge and in His almightiness He is indeed everywhere. In the wide universe of space nothing is so minute as to escape His omniscient scrutiny, and nowhere is there a spot where His power and guardianship are not exerted and felt. For a faint illustration of what, as I conceive, we are to understand by the omnipresence of God, go with me to yonder schoolhouse, and see with what ease the teacher, without leaving his seat, makes himself and his vigilance to be felt throughout the school-room, and by every scholar there. He does not *in person* fill that school room, but with his governing energy and keen-eyed inspection he does. With eye and voice he makes his knowledge, power, and influence to pervade that whole room and all its inmates. Is there not a sense in which he fills that school room with his presence? It is in that sense, as I conceive, that He whose "dwelling place" is heaven (see Solomon's dedicatory prayer, 1st Kings 8) fills the universe with His presence. In His own majestic *person* He never vacates His throne in heaven; yet there is not an inch of space that He does not pervade with His all-searching eye and His ubiquitous sway. It was this thought that constituted the key-note of the 139th Psalm, and that led its writer to exclaim, "Such knowledge is too wonderful for me." The God whom I profess to adore is a Person, and as such He has a form—*what* form I pretend not to know—and as a *Person* He dwells in heaven, and there alone.

THE GEOLOGICAL SIDE OF EVOLUTION.

BY PROF. I. L. KEPHART, A.M.

It is the boast of evolutionists that their theory is strictly scientific—that it is substantiated by the facts of natural history—that the science of geology corroborates the claims of their theory. Mr. Beecher and a few other eminent divines have declared in its favor, and the eminent speakers at the supper given in New York to Herbert Spencer boldly declared that evolution is an established science—so thoroughly established that its claims are beyond the possibility of successful assault. (By the way, the eminent physiologist, Lionel Beale, of London, declares that Spencer's books contain so much false physiology that they will not be read ten years after his death, except as literary curiosities.)

In view of the above condition of things it may be interesting and profitable for the readers of THE MICROCOSM to have placed before them some of the theologic testimony in the case as presented by that most eminent scientist, Louis Agassiz. In a lengthy article which appeared in the *Atlantic Monthly* of January 1874, written only a short time before his death, he deals some telling blows against evolution, and distinctly asserts that Mr. Darwin's anxiety to bolster up a *theory* of evolution blinded his eyes to important facts, and caused him to jump to conclusions that were not warranted by the premises. Turning to the geological side of the question he says:

"As a paleontologist I have from the beginning stood aloof from this new theory of transmutation of species, now so widely admitted by the scientific world. Its doctrines, in fact, contradict what the animal forms buried in the rocky strata of our earth tell us of their own introduction and succession upon the surface of the globe. Let us therefore hear them; for after all, their testimony is that of the eye-witness and actor in the scene. Take first the type to which we ourselves belong. If it be true that there has been a progressive transmutation of the whole type of vertebrates, beginning with the lowest and culminating with the highest, the earlier should, of course, be structurally inferior to the later ones. What then is the lowest living vertebrate? Every zoölogist will answer, the amphioxus, that elongated, worm-like vertebrate, whose organization is nothing more than a dorsal cord, with a nervous thread above, and a respiratory and digestive cavity below, containing also the reproductive organs, the whole being enclosed in flesh. Yet low as it is in the scale of life, the amphioxus is, by virtue of its vertebral column, a member of the same type as ourselves. Next to the amphioxus, come the myxinoids, structurally but little above them, and the Lamper-eels. These are the animals which Hæckel places at the base of his zoölogical tree, rooting the whole vertebrate branch of the animal kingdom in the amphioxus as the father of the type.

"Let us look now at the earliest vertebrates as known and recorded in geological surveys. They should, of course, if there is any truth in the transmutation theory, correspond with the lowest in rank or standing. What then are the earliest known vertebrates? They are selachians (sharks and their allies) and ganoids (gar-pikes and the like) the highest of all living fishes, structurally speaking. I shall be answered that these belong to the Silurian and Devonian periods, and that it is believed that vertebrates may have existed before that time. It will also be argued that myzonts, namely, amphioxus, myxinoids, and Lamper-eels, have no hard parts, and could not have been preserved on that account. I will grant both these points, though the fact is that the myzonts do possess solid parts in the jaws, as capable of preservation as any bone; and that these solid parts if ever found, even singly, would be as significant for a zoölogist as the whole skeleton. Granting also that amphioxus-like fishes may have lived and may have disappeared before the Silurian period, the Silurian deposits follow immediately upon those in which life first appeared, and should therefore contain not the highest fishes, but the fishes next in order to the myzonts, and these are certainly neither the ganoids nor the selachian. *The presence of the selachians at the dawn of life upon earth is in direct contradiction of the idea of a gradual progressive development.* They are, nevertheless, exceedingly abundant in Palæozoic beds, and their fossil forms are so similar to the living representatives of the same group that what is true of the organization and development of the latter is un-

questionably equally true of the former. They lay few eggs, the higher kinds giving birth to only three or four at a brood, whereas the common fishes lay myriads of eggs, hundreds of thousands in some instances, and these are for the greater part cast into the water to develope at random. The limitation of the young is unquestionably a work of superiority. The higher we rise in the scale of animal life the more restricted is the number of offspring. * * *

"Now, these higher fishes being the *first* representatives of the vertebrates on earth, or at least those next following their earliest representatives, where do we find the myzonts, fishes which are structurally inferior to all others, and of which the amphioxus is the lowest member? They come in during the latest period of our world's history, with what is called the present period, to which we ourselves belong. This certainly does not look like a connected series, beginning with the lowest and ending with the highest, *for the highest fishes come first and the lowest come last.* * * *

"But the whole history of geological succession shows us that the lowest in structure is by no means necessarily the earliest in time, either in the vertebrate type or any other. Synthetic and prophetic types have accompanied the introduction of all the primary divisions of the animal kingdom. With these may be found what I have called embryonic types, which never rise, even in their adult state, above those conditions which in higher structures, are but the prelude to the adult state. *It may, therefore, truly be said that a great diversity of types has existed from the beginning.*

"The most advanced Darwinians seem reluctant to acknowledge the intervention of an intellectual power in the diversity which obtains in nature, under the plea that such an admission implies distinct creative acts for every species. What of it, if it were true? Have those who object to repeated acts of creation ever considered that no progress can be made in knowledge without repeated acts of thinking? And what are thoughts but specific acts of the mind? Why should it, then, be unscientific to infer that the facts of nature are the result of similar processes, *since there is no evidence of any other cause?* The world has arisen in some way or other. How it originated is the great question, and Darwin's theory, like all other attempts to explain the origin of life, is thus far merely conjectural. *I believe he has not even made the best conjecture possible in the present state of our knowledge.*

"The more I look at the great complex of the animal world, the more sure do I feel that we have not yet reached its hidden meaning, and the more do I regret that *the young and ardent spirits of our day give themselves to speculative rather than to close and accurate investigation.*

"I hope in future articles to show, first, that, however broken the geological record may be, there is a complete sequence in many parts of it, from which the character of the succession may be ascertained; secondly, that since the most exquisitely delicate structures, as well as embryonic phases of growth of the most perishable nature, have been preserved from very early deposits, *we have no right to* INFER *the disappearance of types because their absence disproves some favorite theory;* and, lastly, that *there is* NO *evidence of a direct descent of later from earlier species in the geological succession of animals.*"

The above certainly contains much worthy of the candid consideration of the candid mind, coming as it does from such an eminent authority. For the purpose of calling special attention to certain parts, I have italicised them. It is to be greatly regretted that the sudden sickness and death of the lamented Agassiz deprived the world of the additional articles promised in the last paragraph. But the perfume of his name still lives, and the weight of his testimony against ruling God out of nature, as materialistic agnosticism seeks to do, has an assuring influence in these times of ministerial-sloping-over to evolution.

EQUIVALENCE AND CONSERVATION OF ENERGY.

BY ELD. C. S. TOWNE.

In the April number of the first volume of THE MICROCOSM, I hinted that, in a future article, I hoped to be able to show the difference between the Equivalence and Conservation of Energy on one hand, and the Correlation of Forces on the other. In doing so it is necessary to have a clear idea of the subject under consideration. In my last article I gave Webster's definition of energy, viz., "Internal or inherent power to act whether exerted or not." I will now give my own definition. Energy is inherently and *exclusively* the power of a *person to act.* The exclusive inherence of energy on a person is the prime argument sustaining the proposition that there is a God, the Creator and Upholder of the universe. As Paul said, "*In Him* we *live,* and *move,* and *have* our *being.*" For if it can be clearly shown that energy is inherent in material forms, we have no need whatever to seek after an infinite God above Nature as its primal cause. In man we see all the manifestations of energy, from the lowest to the highest, embracing the widest range of intellectual, designing, emotional, and deciding action. But in the moment of death all these manifestations of energy vanish at once from our gaze, while the form in all its completeness remains. Then it also, losing its cohesive energy, dissolves back to the dust of its mother earth. Death is the universal and unfailing demonstrator of the fact that energy and matter are not identical. The expression, "Equivalence of energy," suggests the idea that there are two or more manifestations of energy equal, in some sense at least, one to another. I therefore present two propositions—first, that the different manifestations of energy are equivalent to one another in the sense that they are the inherent and essential properties of an individual, substantial entity, that entity being a conscious person; second, that all present manifestations of energy have an antecedent equivalent. In establishing the first proposition, I take man as the highest source of energy at present open to our complete investigation.

How is human energy manifested? In the forms of light, heat, sound, and motion. Are these equivalent one to another? We turn to the individual consciousness for answer. I myself possess light; it shines through my eyes, with a faint glow indeed, but it is light. Co-ordinately, I can see light, and all objects revealed by the light. Because I possess light, the external light of Nature becomes to me a high revealing power. I also possess heat, and the power to give it forth in the act of work, which a machine cannot do. I read that the careful and extended researches of Prof. Heidenhain, of Breslau, have yielded the following result: "In the living muscle *heat always appears* when the muscle does work; when

a machine does work, *heat disappears.*" I have not room, now, to unfold the reason of this, further than to say that the muscle is pervaded by the substantial entity inherently possessing heat, while the machine is not. Co-ordinately with this possession of heat, I can also recognize different degrees of heat, and thus it also becomes to me a revealing power. I also possess the power of giving sound, ascending and descending through many degrees of rising and falling scales, and in the speaking of ideas. Co-ordinately, I can hear and distinguish all sounds in Nature, and recognize spoken ideas, and thus sound becomes to me a revealing power of the highest order. I also possess the power of originating and directing motion not only in the members of my own body, but also in countless complicated trains of mechanism outside of my body and separate from it. Co-ordinately, I can also recognize, analyze, and classify the motions existing in Nature, and this also becomes to me a revealing power. But I, who can do all these things, am one and indivisible. I am conscious of my own personality as separated from all other things. I am conscious that the power of one will is able to flash forth in any one of these manifestations of energy, or in various combinations of them.

The action of external heat, as recognized by the conscious ego, points out the boundary of my form; and it is always the human form. The action of light is both manifested and recognized at but two points in this human form, always in the same place; the conscious ego has eyes. The action of sound is manifested at but one point; the conscious ego has organs of speech. The action of sound is recognized at two points; the conscious ego has ears. The power of self-motion, and the power to impart motion, are confined to this form, bounded by the recognition of heat.

From all these facts I reasonably conclude that the conscious and energetic ego is an organized person, and that light, heat, sound, and motion are simply different manifestations of the energy inherent in an individual person. Hence the law of the Equivalence of Energy becomes unalterably demonstrated in the constitutional structure of every person of the human race. We have seen that each person is not only able to show forth light, heat, sound, and motion, but he is also sympathetically responsive to the same manifestations emanating from other centers external to himself. He recognizes them in his fellow men, and they give him pleasure or pain, according as they are swayed by the opposite passions of love or hatred. But these same manifestations are also presented in superhuman grandeur and power through all Nature, and as we respond to them they yield us pleasure or pain. But the question arises, Where is the center of this boundless energy so like the human in its manifestations? Who is he? For all analogies drive us to think of that invisible center as a person; for we have seen that all human energy centers and manifests its equivalence in an organized person; and as we are forever surrounded and permeated through and through with these omnipotent powers of energy, that person must not only be the center of their equivalence, but also the center of their conservation. For all human experience shows that while we individually have the power to manifest the equivalence of energy, we have not the power to effect its conservation. We cannot retain the youthful vigor of its action through indefinite time. We wax feeble to the last descending step of old age, and lie down in the dark, cold, silent, and motionless grave. But the argument must now pass to the second proposition, viz., that all present manifestations of energy must have an antecedent equivalent.

DOES NATURE FURNISH EVIDENCE OF IMMORTALITY?—No. 1.

BY ISAAC HOFFER, ESQ.

An association of scientists in England, some time ago, had an interesting discussion over several articles read at their meetings by a Mr. Harrison, on "The Soul and Future Life." Mr. Harrison contended "that our sayings and doings are the future life, that not a single manifestation of thought or feeling is without some result, and that our lives live when we are most forgotten." Professor Huxley, in criticising this position, said: "I object to say I have a soul, when I mean all the while that my organism has certain mental functions, which like the rest, are dependent upon its molecular composition, and come to an end when I die. I object still more to affirm that I hold to a future life, when all that I mean is, that the influence of sayings and doings will be more or less felt by a number of people after the physical components of that organism are scattered to the four winds."

Huxley, no doubt, means by "functions" the exercise or form of activity belonging to the organism, so that mind would be a mere performance or operation.

This organic performance, he says, depends upon the molecular composition of the organism—that is, the particular material and form in man's organism produce the vital and mental actions and determine their modes of operation.

This position of Huxley's is the very foundation of the question of immortality, and is the first to be considered in an investigation of the subject.

The question whether life and mind are realities, or only organic functions dependent upon the organism, should be capable of rational solution. It is true that life and mind are not known, and have never been discovered to man, except through a material body; they are manifested only by and through organs composed of matter; and, it is therefore an easy, and apparently natural conclusion that they are the mere operations of organized matter. But there are many actions and operations in which the manifesting agencies are not the power that produces the actions and controls the operations. A steam engine manifests and controls the power that moves it, but it is not the moving power, nor that which produces the power. Vapors rising out of the ocean are produced *from* the ocean and not *by* it, but by heat—an outside action. When these vapors are gathered into clouds and come in drops of rain to the earth, it is not the clouds that gather the vapors and form the drops, but attraction—an invisible power. If we see the lightning and hear the thunder, it is not in the flash nor in the sound that the electric power was formed, but in the clouds where it could not be seen nor heard. In all these cases the actions were not caused by the agencies that manifested them. The fact, therefore, that life and mind are manifested by an organism is no evidence that they are mere operations produced by that organism.

Matter, ordinarily, manifests no life, and it is generally conceded that it has none—not even the potency of life, only the susceptibility of being vitalized. Professor Tyndall has lately made most thorough investigations as to whether matter has

any vitality or spontaneous growth, and has satisfied himself that it has not.

How a molecular composition of conspicuous parts that have no vitality, can manifest vital and mental action without some vital force cannot be conceived. The theory of atomic activity culminating in vital action of its own accord can only be maintained upon the hypothesis that molecules of the elementary constituents of matter are essentially different and have different powers from the same molecules in aggregated matter. Reason and universal experience are against the position that an invisible, or the smallest conceivable part of a thing, has any more or different powers than a visible mass of the same thing. The only difference between separated molecules of the elementary constituents and amassed matter, is, that such separated molecules are in a condition for new combinations, and therefore more easily acted upon or brought into action; but the molecules themselves are not changed in their character, only in their relation. This position, chemistry sustains by positive experiments; while it has so far failed to make any molecular composition that will show vital powers.

Chemistry is able to separate the elementary constituents of matter, able to test them, designate their properties and actions ; and if there was any vitality in these molecules, chemistry should have discovered it. In matter, therefore, nothing can be found to explain the source and character of vitality; and if we trace life toward its source as far as we can, we still find it a transmitted propagation, and are unable to obtain any knowledge from its originating cause. We can, therefore, investigate only its operations and results. The vital part of the seed is in the germ, and this vitality defies examination, either by chemistry or in any other way, except what may be learned from the actions in the seed.

Chemistry can determine the constituent parts of a seed (except the vitality), their exact proportions, and can place these parts together in proper form, but cannot produce a seed that will germinate, nor furnish information as to what vitality is. We know that when the proper conditions are provided, the action commences in the seed, that this action produces certain and definite results; that there must be an acting power or else there could be no action and no results. We infer that this active power is as certainly a reality as the material that was brought into action by it, and formed into plants and animals; for that which acts, forms, and transforms, can not be less a reality than that which yields to the action and admits of being formed and transformed.

The evidence of past life in the rocks and crust of the earth, and the manifest vital actions in all animate nature attest the greatness and unlimited extent, and assert the reality of a vital force. This vital force, although invisible, and not susceptible of detection and examination by any means yet devised, is the power that builds plants and animals. It not only contains the power to select the necessary material and place it in proper position, but the plan or model required in each case: the models may differ—one may be for the building of a horse and the other for that of a bird—but the process of the building seems to be the same.

An individual life is an ultimate part not capable of division or diffusion; having no constituent parts, it cannot be resolved into composing elements, like matter. Its action invariably individuates and forms the matter acted upon into shapes of its kind, the material is adjusted to the vital.

While life and mind seem to be more closely connected than life and matter, there is, in reality, a much greater difference between the two former than between the two latter. Life exists without mind as well as matter does without life. In vegetable life there is no evidence of mind whatever, and in all animal life, except man, there is but a foreshadowing of a fully developed intellectual condition. Life is developed and sustained by what it selects out of matter, while mind is developed by knowledge acquired through the senses, and by its own innate action. It is not developed by life, nor by that which develops life, or else the lion and the elephant would have the greater minds. Life moves within certain prescribed lines like a machine that has its movements fixed, its powers applied, and its actions producing and reproducing the same results. It has no inherent power to bring about, control or change the necessary conditions or surroundings for its actions.

Mind, on the other hand, instead of being controlled, exercises control within its sphere. Instead of having prescribed lines of action which it implicitly follows, it prescribes lines of action itself and compels the observance of the same; it modifies and regulates its own actions, and changes and transforms its surroundings.

Life and matter are mere agencies, the former active and the latter passive. They cannot originate or cause action; they move and act, and motion and action proceed from their movements and actions, according to fixed laws and subject to special requirements and special conditions, wholly without their power to bring about, or to change or control.

Mind is not an agency, but, in its sphere, an impelling, directing and controlling power—a self-exerting energy—capable of originating, propagating, directing and controlling action, and, differing from mere life as much as man differs from a machine.

In all man's work there are but three things employed, mind, force and matter; of these, mind is the elementary and operating power, force the acting agency, and matter, the passive thing acted upon. We know that every work of man had its inception, its development in all its details to the final completion, perfected in mind before it was brought into manifest being. Part of this work only, may have been designed at one time, but every part was first formed in mind before material representation could be made, for all work is only a material representation of mental operation. Mind, therefore, is the efficient cause of all the works of man. Thousands upon thousands of inventions, designs, and accomplished results attest its power and affirm its reality.

In man, mind, life, and matter are united in one interacting personality. In this union, the mental part supplies that which gives apprehended and known existence to the activities and works of nature; it gives conscious power and active energy to man, and, instead of acting like a dependent function, it subordinates and controls the other two parts of the personality, and makes them its agency in all its operations. It assumes control of matter and life and of the forces of nature. Matter, in all its various forms and conditions, is made to subserve its purpose; life, whether vegetable or animal, submits to its demands and the forces of nature are converted into subservient agencies. It is a monad of energy, self-exerting, self-conscious, self-determining—a thinking, reflecting, reasoning intelligence, capable of acting contrary to disposition and affection.

That mind seems to be dependent upon life and a material body, arises from the fact that mind, life, and matter are an inseparable *one* in man's comprehension; yet, each acts or serves its distinctive part, and each part has distinctive characteristics, as has already been shown. Besides, there seems to be a precedent condition to the formation of man's organism which forms and shapes the capacity, and prepares and supplies the necessities, for mind's existence and operation. This condition controls life and matter, and compels the building of man into the shape and form suited for mind's occupation, and supplied with all the appliances and dependencies needed for its operations.

Man's organism itself shows that mind belongs to, and is a part of nature; and has its operating and manifesting position provided therein, and while it constitutes but a part of man, it is the only part that can have conscious knowledge and can knowingly act. It is that part by, and in which alone the question of reality or existence can be raised, and by and in which it can be examined and must be decided. Consciousness is the only test of reality, for without conscious knowledge, there is no apprehended existence, and, tried by this test, mind, the testor, could hardly be found less a reality than the thing tested by it. The acting, doing and performing thing can not be less than the thing through and by which it performs or the result produced by the performance.

ALL SIDES OF PRAYER-CURE.

We give three concise articles herewith upon this deeply interesting discussion, which speak for themselves. We have received many articles from different sections of the country going over all phases of the question from the possibility of absolute miracles at all times in response to faith and prayer, down to the moderate and very reasonable view of Rev. Dr. Staple which agrees so fully with our own already published views. We give, however, the three articles, out of a score on the subject, as fairly covering the ground:

MODERN PRAYER OR FAITH-CURE.

BY REV. DR. M. STAPLE.

Mr. Editor: I read your editorial in February number of THE MICROCOSM upon the subject indicated in the heading of this article, with a great deal of interest. With the spirit of your article no fault can be found, even by the most abject devotee of the faith and prayer-cure doctrine. Courtesy, candor, and Christian charity are its prominent characteristics. You expressed a wish that the truth of the claim to the possession of such power might be demonstrated, thus showing your readiness to be convinced, if sufficient evidence can be furnished, while *your* expressed doubt indicates a cautious spirit, with which all pretended proofs should be received, and thus be weighed in the balance of unprejudiced reason. That the subject involved is of great importance, no intelligent person, be he Christian or infidel, will deny. The claim set up must be either *true* or *false*. If true—if Christians do *now* possess the power claimed—it may be used not only in the relief of human suffering, in the continuation of human life indefinitely, but may become, as you urge, a powerful element, if rightly used, in the speedy triumph of Christianity over the doubts of *all* but the incorrigibly wicked. But if, on the other hand, this doctrine be founded in delusion, then whatever may be the present, or temporary benefits of a physical nature to comparatively few individuals, its effect cannot be otherwise than pernicious to the cause of Christianity in the end.

Perhaps nothing has had a greater tendency to weaken the force of the argument derived from miracles in favor of the divine origin of the *Bible*, than the pretended miracles of superstition and hypocrisy. The cause of Christianity has suffered enough by false pretensions to miraculous power. We want no more shams in this respect; but if God has endowed certain persons with the gift of *power*, all good men—all who are interested in the triumph of *Christ* in the world—would wish to know it, that the best possible use may be made of the fact in defense of divine revelation. But if the parties referred to are laboring under a delusion, however honest they may be in this respect, they certainly should be opposed and exposed by all true and good men.

There can be no compromise. To say they mean well is not enough. Is it *true* that God through them cures otherwise incurable diseases, in a supernatural manner is *the* question? If he has *wrought* such cures then the evidence to produce conviction in the minds of candid men and to put the unreasonable sceptic to silence, is available, and should be produced.

It is not enough that some wonderful cures are effected by them; the *merely wonderful* is not proof of the supernatural. All claims to the possession and exercise of miraculous power should be put to the most crucial test, and all *honest* claimants of such *power* will readily consent to have their professions thus tested. That men have been endowed with such power, that it is *possible* for them to be thus endowed *now*, must be admitted by all believers in Christianity; hence the question is not in relation to the *possible*, but to the *actual* possession of such power by those who now claim to possess and to exercise it. We do not call in question the honesty of any parties concerned in this matter; but we do most sincerely believe they are laboring in some respects under serious delusions, and that all *real* cures that have been effected, are the result of natural causes.

We will take, for illustration, the *case* referred to in your article. It is certainly the best authenticated instance of *faith-cure* that I have seen. That the gentleman was *sick*, is *now well*, and that he recovered his health while under the advice and control of one claiming the *power to cure by faith*, are admitted facts.

But do these facts prove the interposition of supernatural power? We think not. Let us see. First, it is not certain, by any means, that his trouble was *organic* disease of the *heart;* his *difficulty* might have been purely sympathetic, arising from other causes; mistakes of this nature are common. Second, he retired from his usual avocation, and was relieved from the anxiety connected therewith. Third, he changed his local habitation and surroundings; and last, but not least, was inspired with the hope of recovery by *faith* in the person to whose control he had so completely surrendered himself. Now if his heart difficulty was not organic, and he had laid aside all care, and removed to another locality, and acquired the same hopefulness of spirit, by faith in "bread-pills," would not the result have been the same? It is certainly

possible; consequently there is no satisfactory proof, in his case, of miraculous interposition in answer to prayer. Let the reader compare this, or any other well authenticated case of cure by the claimants of apostolic power, with the cases reported by St. Luke in the 3rd and 9th chapters of the Acts of the Apostles, and we think they will find just cause to question the validity of their claim. There are in the cities of New York and Boston, many well-known persons—blind, deformed, and crippled from their birth—universally acknowledged to be beyond recovery by human power or skill. Now let one of these persons be restored to perfect soundness in answer to prayer by the laying on of hands and by the anointing of oil, or by the operation of all these combined, *then* we shall have demonstration of the supernatural; but not till such a cure is placed beyond doubt will the evidence be satisfactory to cautious and intelligent men. All miracles demonstrate the presence of the supernatural, and place it beyond all doubt. Take any, or every miracle recorded in the Bible, and this will be found to be correct. If the statements of facts made are admitted, then miraculous interposition must also be admitted. Take for illustration the widow's son; if we admit that he was dead, and that Christ restored him to life by saying "Young man, arise," then a miracle is as evident as the shining of the sun at noonday.

Now, we inquire: is this true of modern *faith-cure*, so-called? Do they not rather, when all the facts are admitted, suggest doubt to the candid inquirer after truth?

Take also the instance of the healing of the cripple from his birth, by Peter and John. It would appear that the meeting of the parties was purely accidental; the lame man did not go there to be healed; nor did he expect or ask to be healed; there is not the least intimation that Peter and John went there with the intention of healing him or anyone else. He was a mendicant, depending upon charity. He made an appeal to the Disciples, as he did to others for *alms*. Peter said: "Silver and gold have I none, but such as I have give I unto thee. In the name of Jesus of Nazareth, rise up and walk." The impulse came upon Peter unexpectedly, and it is questionable which was the most surprised, the *lame* man, the apostles, or the multitude.

It was a miracle—suggested and effected by *divine* inspiration and power; not by human will, wisdom, or prior arrangement. Hence it furnished the most conclusive evidence, to all parties concerned, of the presence and power of Christ.

There are, I think, but nine references to the manifestation of miraculous power by the disciples in the Acts of the Apostles, and *these* are scattered through a period of about thirty years. They are all attributed either to Peter, John, Philip, Stephen, or Paul; and in no instance is there any intimation of prearrangement of parties interested. A prearranged miraculous *cure* is not found in the entire record; nor do we find that the apostles ever made a profession to an abiding endowment to work miracles, or ever invited the lame, halt, blind, and sick to come to them to be healed; but when such cures were effected by them, they were the result, as before remarked, of immediate inspiration and impulsion by the Holy Spirit, and when not thus impelled to such action, they were as weak in this respect as any other men. Divine wisdom determined when, how, and through whom these revelations of immediate presence and power of Christ over all things should be made. It was not left to the will and wisdom of the apostles, and it is greatly to their credit that they never put forth any claim to such authority or pledged themselves beforehand to any such miraculous interference with the laws of Nature. No man, except the man *Christ Jesus*, ever possessed the abiding endowment of such *power*, to be exercised at His own will and pleasure, "and in Him dwelt all the fullness of the Godhead bodily." It may, however, still be urged that the apostle James affirms that "the prayer of faith shall save the sick." True, and we have no wish to doubt or reject the truth of the declaration made, or that it presents a precious truth that should lead to and give inspiration to prayer and faith in every emergency. This we heartily and joyfully believe. But are we to accept the declaration in an unlimited sense? Did the apostle mean to say that all sick persons, in all ages, and at all times, could be cured by the prayer of faith? And that such faith was a possibility at all times and in all ages? This will hardly be claimed; for if this be true, then man has the power of reversing the law of death, and securing immortality on earth.

The passage, therefore, must be interpreted not only in harmony with the entire paragraph in which it stands, but with the tenor and teachings of the Holy Scriptures upon the subject involved. Taking for granted some limitation as necessary to the proper interpretation of the passage by all candid seekers after truth, we remark, the key to its proper exposition is in the 17th verse of 5th chapter of James: "Elias was a man subject to like passions as we are, and he prayed earnestly that it might not rain; and it rained not on the earth by the space of three years and six months. And he prayed again, and the heavens gave rain."

Now does any man believe that the prophet could at any time pray and thus open and shut heaven, or that he could have effected such a wonder at any other time or under any other circumstances? Was not *his* prayer and faith of special endowment and special inspiration of the Holy Spirit to accomplish special effects, for a special purpose? So God did sometimes give the inspiration of prayer and faith to heal the sick, as in the case of Publius by Paul. Is not this the utmost limit of the passage so often quoted in defence of modern faith-cure? Will not a single step beyond this involve the most absurd and illogical results? That many persons have been restored to health, through the tranquilizing and hope-inspiring influence of prayer, who would have died but for its influence, is not only admissible, but we believe it to be of common occurrence, and in this sense do we believe that the prayer of faith saves from sickness and even death; but there is nothing supernatural in these instances. That God in some instances has inspired a prayer of faith, that has acted immediately in the restoration of health, even in otherwise incurable diseases, is a matter of *divine record* and will be accepted by all who believe in the inspiration of the Scriptures. What has been done in this respect in the past, can be accomplished *now*, if God sees fit thus to reveal Himself to the present generation of men. What is called for now, is a cure that will demonstrate the supernatural, and will not in itself be suggestive of serious doubt to the mind of thoughtful and candid men. This is what we understand you to call for in your editorial, and with this desire we heartily agree.

NEW CANAAN, Conn.

ELD. TEETER ON PRAYER-CURE.

Editor of THE MICROCOSM:

DEAR SIR—I have read your article in the February MICROCOSM, on the prayer-cure, with much satisfaction. I am a believer in physical healing *by means of* the prayer of faith. I am truly glad to see that you are not a *dis*believer in it, though evidently an honest doubter. Yet I am not surprised at the impartial attitude you have assumed on the question and your evident desire to get at the truth. I have noticed this to be a characteristic of your mind and heart, and has had not a little to do in begetting in my mind that confidence in you which I find myself possessed of.

I am, however, of the opinion that you are in need of more light on the general question than you seem to be aware of. You seem not to have come across any *unquestionable* evidences of cures wrought through Divine interference, in answer to the prayer of faith. That such exist is either true or men and women whose lives and works declare them credible witnesses "are found to be liars."

You seem to think the instances of cures effected, or alleged to have been effected, through the prayer of faith, which have been reported, are of the class that may be explained on other hypotheses. Assuming that this is true, may not the fact that these miracles, thus far, are of what may be called the lower order, be owing to the measure of unbelief that as yet exists in the Church of God on the whole matter? We read that our Saviour could do no "*mighty* works" in a certain locality, because of the unbelief with which He found himself surrounded, and He then only laid "His hands on a few *sick* folks and healed them," *i. e.*, performed such cures as might, in this day, and possibly were then, attributed to "natural or psychological influences." May not the same be true now? Undoubtedly the Church of Christ is possessed of a vast amount of unbelief and doubt on this whole question, and it seems to me that if no "mighty works" have yet been wrought, the blame may be legitimately placed there, and not on those who are doing what they can to remove the hindrances. And it would seem to me as fair to blame Jesus Himself for His failure in that case referred to, as to blame God's faithful ones for a failure to produce such cases of cure by prayer as would convince the most skeptical. If we base our faith in this matter on the Scriptural teachings or statements of Scripture, we must see that the cure itself is conditioned on faith, and to seek the cure to *beget* faith is reversing God's order, and must end in disaster. "For he that cometh to God must believe that He is, and that He *is a rewarder* of those who diligently seek Him." We must believe that we shall get the things that we ask for before we can get them. Faith must be gotten otherwise than by the *results* of *experiment*.

Have you ever met Dr. Callis, of Boston, or read his annual reports? Trusting that God may guide us into the truth on this question,

I am yours, with profound respect,

CH. TEETER.

DRESDEN, ONT.

REV. M. STONE, D.D., ON FAITH-CURE.

This subject has been of late eliciting considerable attention with more of speculation, and less of reverence than it deserves.

It may be that we have been too hasty in concluding that Mark 16: 17, 18, had all its fulfilments in apostolic times. "These signs shall follow them that believe; In my name they shall cast out devils; they shall speak with new tongues; they shall take up serpents, and if they shall drink any deadly thing it shall not hurt them; they shall lay their hands upon the sick, and they shall recover." There was a good place to put in a limitation if one was intended. A limitation has been very confidently affirmed for several ages, as if we had been let into the secret counsels of God. He certainly saw fit, when His Son made His visit to this world to act as our Advocate and "Mediator between God and man," and when He was unfolding His plan of salvation and delivering the "Lively oracles" to us by the agency of the apostles and others, to authenticate their mission by miraculous interpositions. There might never again occur events that would so clearly call for miraculous credentials, and yet God nowhere told us so, nor has He intimated that other and lesser events might not make special interpositions desirable, and even necessary, though less common and less striking than some of them were in those times. We do not know what exigencies may arise requiring their repetition. Unless God has informed us of all the exigencies that may call for other interpositions, it is not quite modest in us to decide that no such will ever be required. If there should be, it is quite probable that they would be less frequent, for those times were big with events and consequences that may not have their equal in time. The agents of those miracles, in times of their greatest frequency, did not have those powers under their own control. *They* could not *always* work miracles. They wrought none on themselves, nor on each other. They no doubt received special impulses, when God saw fit to use them, of which He alone could judge. Why may He not do the same now? In thousands of cases, the apostles and others who used miraculous powers, would have arrested persecution, if the power of miracles had been a permanent possession under their own control. God has lost none of His power or goodness, nor has man lost much of his unbelief; so, then, for aught we mortals know, occasions may arise when God may see reasons for deviating from the ordinary course of affairs, and give a special impulse of faith to either, or both, the agent and subject of a miraculous cure. What is called in the 5th chapter of James, "The prayer of faith," is no doubt a special gift, that no one can always exercise at will.

When God designs to perform an unusual act, He would very likely give a premonition to some one or more of His children, and excite special faith, with which they would "come boldly to the throne of grace." But it would be the height of presumption, if not of impudence, to set up this healing by miracle as a trade, or to advertise it as a common endowment in one's habitual control, to be exercised on call, as a doctor goes to his patients. We have many of us been the humble agents in the greatest miracles ever seen on earth—the resurrection of a dead soul to an immortal life, by an impulse of faith in which no doubt was felt, and often it has been the case of an entire stranger. But that case stood out by itself, with a distinctness on the mind of the agent that said the impulse was from God. Many a Christian would give the world for the permanent possession of such faith, but God holds all such gifts for His own sovereign dispensation. Christians do sometimes pray for a thing "with *assurance* of faith," but it is the gift of God; and who can tell but such faith may be

given at the bed of the sick, as well as over an inquiring sinner?

This writer has never seen a miraculous cure, and never may see one, but still, as I cannot know all God's plans, I shall not allow myself to reject the possibility of such interpositions. There will no doubt be frequent impositions, as there have been, and reports of such should be carefully scrutinized. Many of them may be psychological purely. Very few have seen such cases as have been reported in the papers, and very few have felt such an impulse of faith concentrated in a particular patient, as to move them to offer themselves to the sick, blind, lame, deaf, as a healer in that miraculous way. That promise in Mark 16th should make us fear to affirm confidently that no such interpositions may be seen, until we have heard again from God. These may not occur in every age, nor in every place. Not even the Apostles could always perform miracles: Mat. 17: xiv-xx. God can heal all manner of sicknesses and infirmities, and he can empower his disciples to do it now as well as formerly, and has no where repudiated these interpositions, nor authorized any man to advertise himself as a miraculous healer.

If unbelief should increase a few years longer as it has grown for a few years past, there may be as great need of miracles as in our Saviour's day. Certain it is that the *divine* mission of Christ is denied by many, and the atonement, the fall of man, and the sanctions of the law are now denied by many who call themselves Christians, and multitudes are preaching a diluted Gospel, that contains little or nothing of its native efficiency. What measures God will employ to restore faith in the divine mission of Christ we may not know, but it is not likely that it will always remain under the dishonor that now rests upon it.

OMAHA, NEB.

UNIVERSAL SALVATION

BY JUDGE O. S. POSTON.

I am not a theologian—only a lawyer—and I will argue the question of "Universal Salvation" from a Rationalistic and Biblical standpoint. Indeed, some reason should intermix with all dogma.

Assuming that the Christian religion is the only true one, it must be admitted that if it was not proclaimed until many thousand years had heralded its millions to the world of souls, that it has ever since been limited to a comparatively narrow compass, and that it embraces to-day not more than one-fifth of the world's population. Indeed, in the seventh century, under the providence of God, it was nearly superseded by the Mahomedan faith which took possession, and holds one-half of its original territory. Obviously, it has not been the purpose of God to make it universal, nor to give it permanency when once established. I mention these historical facts as entitled to some weight in the argument against the orthodox construction of the Scriptures, that belief in special dogmas are essential to man's future happiness, and as proof that God has never established any such universal criterion as a limit to His mercy and love for mankind. The Old Testament writers did not announce that eternal punishment would be inflicted for any of the sins of mankind, and whilst it stated that the body would return to the dust, it declared "That the Spirit should return to the God who gave it;" (Ecc., 12th chapter, 7th verse.) That was the most distinct doctrine taught concerning the destiny of the soul, till Jesus brought life and immortality to light, and announced His gospel that was to be "glad tidings of great joy to all men." As to those who lived anterior to the Christian era, it would be unjust to punish where no law had been announced that had been infringed. That is a rational doctrine which was indorsed by Paul, who says, "That where there is no law, there is no transgression." (Romans, 4th chapter, 15th verse.) Some have supposed that only the righteous of those past ages would be saved. But Paul truly says that "None are righteous, no, not one." (Romans, 3rd chapter, 10th verse.;) and Christ taught substantially the same doctrine. So that the moral criterion could not exist.

I will next argue as to the teachings of the New Testament on that topic. First, I think I can safely assume that all that die in childhood, before they reach years of discretion, are amongst the number that will certainly be saved. Jesus said: "Suffer little children to come unto me, for of such is the kingdom of Heaven." That will certainly include one-half of the human family who are saved without any probation, and upon similar equitable principles all the imbeciles would be entitled to God's mercy. Secondly, I assume that salvation is promised to all the poor. From a perusal of Christ's teachings, every one must conclude that he regarded poverty as one of the chief Christian virtues, and was of opinion that those who, Lazarus like, had their evil things in this life, would be compensated in the future existence. He urged all those who listened to His teachings, not to lay up treasures on earth, but to sell what they possessed, and give it to the poor; that they should give to every man that asked of them, and loan to those from whom they expected no return. To the class called "the poor," he made as strong promises as any recorded in Holy Writ, saying, "Blessed are ye poor, for yours is the kingdom of God. (Luke, 6th chapter, 20th verse.) The poor constitute at least ninety-five per cent. of the human family, and are promised an entrance into the kingdom of God without any other special qualification. Thirdly, one would suppose that the Jews that lived in the days of Paul, and had heard Christ's teachings, and witnessed His miracles, would certainly be required to profess the Christian faith; but Paul assures us that they would be saved for their Father's sake. "That God had concluded them all in unbelief that he might have mercy upon them all." Read the 11th chapter of Romans for proof of that assertion. The last class left to dispose of are the rich people. In the 19th chapter of Matthew, when Christ said it was easier for a camel to go through the eye of a needle, than for a rich man to enter into the kingdom of Heaven, some of his disciples inquired, "Who, then, can be saved?" and he responded, "With men, this is impossible; but with God, all things are possible."

Now, if all that lived before the Christian era, if all that have since died in childhood, if all the poor that have lived and suffered in this world, if even the Jews that lived in the days that Jesus taught his religion, are promised salvation without professing any creed or dogma, or performing any religious ceremony; then, I ask, is there any criterion of justice, is there any principle of equity or right recognized by God or man that would warrant the consigning of the residue of mankind to eternal perdition? If the Scriptures I have quoted are entitled to no force or effect, why should any other part of the same volume be entitled to greater

consideration? We are assured, both by Holy Writ and personal observation, that God sends His rain and his sunshine alike upon the good and the evil, the just and the unjust, in this world, and may we not, by a parity of reason, conclude that in the future life God's mercy, which we are told endureth forever, will continue to light the pathway of every mortal that shall pass through the portals of death to purer aspirations and higher conditions? If eternal perdition is to be the portion of any part of humanity, it ought to be inflicted upon some principle that would prove that "God is no respecter of persons," and upon some criterion of universal application. But, as that cannot exist under the circumstances of this life, the common sense of mankind and a high appreciation of the justice and mercy that appertains to God's character, as taught by the highest inspiration of the past and the present age, forbid its belief.

HARRODSBURG, Ky.

ETHER.

BY REV. PROF. S. WOOD.

The ancient Greek philosophers personified Æther, which they regarded as the representation of the great force of the universe; and as there could be no force without substance, it represented this primordial substance also. They supposed the worlds to have been evolved by an occult union of this force and substance. The Orphic hymns speak of Aether as the soul of the world—the animator of all things—the great principle of life—the divine essence. Æther was considered to be the lightest and most active form of matter, and Day had the power of transforming it into heavier and visible matter. The children of Æther and Day were the objects of the visible creation; the heavens with all the stars, the land and sea. It may be that these ancient people had a more correct conception of this all-pervading cosmical ether than the modern scientists. Leaving off the personification and translating the figures into common language they may be rendered not only intelligible but rational. These figures contain the concept of substance and force united, and yet as two distinct principles, viz.: the infinite soul from which all things are, and the essence or formative power by which all things are. It was by the union of Æther and Day that visible things were begotten. Here, as in many other myths of the ancients, the symbols were correspondential. Ether was made to represent the divine love or infinite substance, and Day, or Light, represented the divine wisdom, and by the mysterious union of these two principles in act, all things were evolved or brought forth like distinct generations, so that all created things might be traced back, as in a genealogy, to the first great cause. As not anything can exist by itself, unconnected with what is prior, the earth could not exist without the sun, nor could the sun exist but from something prior; but the sun being the inmost or highest in nature must be sustained by influx from the spiritual sun through which it was formed, either mediately or immediately.

The manner in which this spiritual substance is terminated in the formation of this inmost natural substance we may never know; nor do we know how this highest natural substance is transformed into the vegetation of the earth, although the process is continually before us. The first manifestation in material substance was, possibly, a nebulous appearance composed of "atoms," which were formed by these prior forces, from pre-existing substance of a higher degree, "So that things which are seen were not made of things which do appear." It must not be forgotten here, that God is always present in His universe in what we call the laws of Nature, and that these laws are but the manifestation of this influx; and, as man is the sole *end* of creation, everything must have conspired to this end; and influx into these particles (so near the living forces) directing them to use, would give them inconceivable activity, and analogy would lead us to suppose that they were brought into closer embrace by that which holds things together, *gravity*.

The activities of these ethereal particles were not destroyed by their coming together, but they were in general united in the fiery vortex of the sun; and as the sun still receives this influx from the spiritual sun into its inmost bosom, it cannot become a solid body (like the planets which do not receive this direct influx) but its substance must remain active from centre to circumference. As no action, caused by gravity, could give rotary motion, which the sun is known to have, this motion must have been originated and sustained by influx, and therefore proceeds from the inmost of its substance.

The rotary motion would be greatest in the interior of its vortex, and less in a definite ratio to the surface where the individual activities of the particles would be at their extreme.

This influx forever sustains the energy of the sun, and enables it continually to radiate its active substance in all directions, as a finite effigy of the spiritual sun from which it derives its origin.

This radiance from the sun contributes the cosmical luminiferous ether that fills all space and is the inmost of all substance—the substance of which the planets and comets are formed. This radiating substance carries in its bosom the fire of the sun manifested as light and heat, but not until these radiating particles come in contact with a resisting medium, or until there is reaction. The light is first manifested in the rarer portions of the atmosphere, the heat requires a denser medium, and is more sensible as the density of the resisting medium increases. On the top of high mountains the atmosphere is too rare to develop heat in any considerable degree; but when the rays impinge upon rocks at the same altitude, the heat becomes manifest. These radiating particles are sent off from the sun by the vibration or pulsation of its surface substance, and these pulses continue in the same relation to each other from the inherent quality imparted to them at their birth. They reach the earth in this manner, and these spaces are popularly called waves or vibrations As this ether is radiated from all the stars, it fills all space, not as a "quasi-solid" or "semi-jelly," but is an active force, proceeding directly from the sun, as the force of all physical energy. And here I must beg pardon of Stallo, who says: "Force is a mere inference from the motion itself under the universal conditions of reality, and its measure and determination lie solely in the effect for which it is postulated as a cause; it has no other existence. "The only reality of force and its action is the correspondence between physical phenomena in conformity with the principle of the essential relativity of all forms of physical existence. That force has no independent reality, is so plain and obvious that it has been proposed by some thinkers to abolish the term *force*, like the term *cause*, altogether." The difficulty with these "clear-

thinkers" (?) is that they do not recognize anything above the physical that *strikes* the senses. Their minds do not rise above mechanics. The *clear* and *concise* definition, above given, refers only to "*vis a tergo*," as we see it in mechanics; and those physicists who see nothing higher, recognize no other force. But this *vis a tergo* does not explain the origin of FORCE itself: *that* "will not *down*" at their bidding. It may be said that there is something behind *that*, but this brings us no nearer the solution. God, the infinite source from whence force is derived, is not outside of Nature, acting from behind; but is above Nature, and acts from within. Hence, active forces, as distinguished from *vis a tergo*, act from within, as if the thing acted from itself; as, for instance: the wind prostrates a stalk of corn, and even draws and breaks some of the roots on the side of the wind: this is a force from behind. The cane afterwards rises and resumes nearly a perpendicular position: this is a force from within.

When we interrogate Nature, she replies: CAUSE and FORCE.

IS MAN'S PHYSICAL NATURE AN EVOLUTION FROM THE LOWER ANIMALS? No. IV.

BY REV. JOS. S. VAN DYKE.

If an improved variety of monkey was "evolved" from some pre-existing lower form, what prevented the individuals from becoming sterile "*inter se*," the variety thus disappearing entirely? It is an established fact that, both in plants and animals, decidedly improved varieties, that is, those which have acquired profitable characteristics bearing but slight resemblance to those of the species, tend to sterility. Precisely the reverse of this is what we should have expected if the differences between varieties really become augmented into the wider differences between species. Moreover, since two distinct species are almost invariably sterile, if not universally so, when their members are united, it follows that the individuals of different varieties should be expected to grow mutually sterile, more and more so as they approached a new species; but the fact is diametrically opposite—varieties of the same species are mutually fertile, and more so than individuals of the same, and especially of an improved, variety. Again: closely allied species, as the horse and the ass, produce offspring which are either sterile or become so in one or two generations; which apparently ought to be otherwise if varieties and species are fundamentally the same, differing only in degree,—indeed, hybrids ought to be more fertile, for the offspring of individuals of two different varieties commonly are. Nor is it possible to affirm that this tendency to sterility, either in hybrids or in the offspring of a variety which has been interbreeding too long, may result from the operation of natural selection, for it is inconsistent with the power ascribed to this agency, if not inconceivable, that natural selection should have accumulated and preserved increasingly advantageous increments of sterility—profitable additions of a negation. Therefore, before the mutation of species can be considered established four hard facts should be satisfactorily explained:

1. Why do marked varieties tend to become sterile if new vigor is not imparted by crossing with individuals of another variety under the same species? Darwin says, "It is a great law of nature that good should come from crossing." Why? Evolution can give no answer. The advocates of the immutability of species can reply, "The good would seem to come from the contribution to the offspring, by each parent, of some quality or qualities which the other lacks, or has only in small measure, which qualities are essential to the species under which the varieties occur." In confirmation of this he is able to call attention to the fact that the good is in exact proportion to the amount of positive structural differences in the crossed parents; and that when a variety has all the positive features of its species no advantage results from crossing with another variety. Evolution ought to assign some reason why crossing is so exceedingly advantageous. It ought also to explain how this tendency to sterility is acquired. It ought to show how an improved variety of the monkey-tribe could pass the immense distance which intervenes between the simial family and the human, without becoming extinct, the individuals growing sterile "*inter se*."

2. Why are distinct species invariably sterile "*inter se?*" If good comes from the crossing of varieties, an actual remedy being thereby furnished for the evils resulting from close interbreeding, and if species are simply varieties further removed, it is a little remarkable that species when crossed are not fertile. "The view generally entertained by naturalists," says Darwin, "is that species, when intercrossed, have been specially endowed with sterility, in order to prevent their confusion. This view certainly seems, at first, highly probable, for species within the same country could hardly have been kept distinct had they been capable of freely crossing" (Origin of Species, p. 233). The barriers of species seem fixed with a measure of rigidity which effectually prevents individuals from propagating either monstrosities or new orders of beings. Individuals of two remote species of the monkey family could not have been the parents of man's ancestors.

3. Why are hybrids, or the offspring of allied species, sterile, or nearly so? Darwin says, "I doubt whether any case of a perfectly fertile hybrid-animal can be considered as thoroughly well authenticated" (Origin of Species, p. 238). Again: "Hybrids from two species (of plants) which are very difficult to cross, and which rarely produce any offspring, are generally very sterile" (Idem, p. 241). Once more: "A multitude of cases could be given of very closely allied species which will not unite, or only with extreme difficulty" (Idem, p. 241).

How, then, could individuals of two closely related monkey species become the progenitors of a hybrid progeny which ultimately evolved the human species, which retains fertility after thousands of generations?

Darwin, it is true, makes light of the sterility of hybrids. This he might have done with propriety, if sterility had characterized the crossing of varieties, instead of the interbreeding of individuals of an improved variety; if increase of fertility had marked the interbreeding of individuals of an improved variety, instead of the crossing of different varieties belonging to the same species.

To blunt the force of the argument from sterility, Darwin has invented two hypotheses; (*a*) Individuals of the same species are susceptible of all degrees of lessened fertility, therefore sterility is not a special endowment to prevent the transmutation of species; (*b*) Sterility between different species may have been induced by modifications slowly impressed by unknown causes on the reproductive systems of parent-forms—nothing

stands in the way of crossing species successfully except the want of adaptation in genital organs and in the reproductive elements.

4. What causes could have produced sterility? If a species differs from a variety merely in being a more permanent aggregate of characteristics slowly acquired through nearly interminable periods, and if, consequently, sterility is not a special endowment, how could it have originated—to say nothing of the difficulty of explaining why it should be operative where, according to the theory, it should have been inoperative, and inoperative where it should have been operative?

Darwin concedes that natural selection could not have produced sterility, that no advantages could come to separated species by being rendered mutually sterile, but that it would profit an incipient species if it were rendered in some slight degree sterile when crossed with its parent-form, or with some other variety; for thus fewer bastardized and deteriorated offspring would be produced to commingle their blood with the new species in process of formation; that the facts connected with reciprocal crosses are directly in the way of accepting natural selection as an agency in the production of sterility. Forced to acknowledge that his pet theory furnishes no explanation of the facts connected with sterility, he takes refuge in his oft-repeated proposition that sterility is incidental on unknown differences in the reproductive systems of the parent-species (Origin of Species, p. 248–9.

It was once thought that the sterility of hybrids might possibly be caused by the commingling of two different constitutions into one, disturbances occurring in the subsequent development. This is now abandoned, it having been ascertained that sterility affects the offspring of dimorphic and trimorphic forms, as in plants which present two and three forms which differ in no respect, except in their reproductive systems. Why are these, whose organisms are precisely the same, infertile *inter se*, when the pollen of the one is artificially communicated to the stigmas of the other, the difficulties connected with their reproductive systems being thereby obviated? Lo, they are as sterile as two distinct species.

If, in the vegetable world, there had been no sterility between separated species, it seems evident that there must have been confusion inexplicable. If the stigmas of each flower and each blossom could have been fertilized by the pollen of any plant, it would have been impossible to determine what kind of fruit any particular tree would bear. A garden in which there were fruit-trees—peach, apple, cherry, and plum; small-fruits—strawberries, raspberries, blackberries, etc.; vegetables—peas, beans, potatoes; flowers—roses, fuchsias, pinks, etc.—what would be its products in the fall? Who could tell what pollen would fertilize each blossom?

SCIENCE AND RELIGION.

J. W. LOWBER, M.A., PH. D.

"Avoid profane and vain babblings and oppositions of science, falsely so-called; which, some professing, have erred concerning the faith."—(1 Tim., 6: xx-xxi.)

The genus babbler existed eighteen hundred years ago, and had two species, the same as at present, viz.: vain and profane. The vain babbler is empty, frivolous, and conceited; with no apprehension of the solemn aspects of the universe, and no comprehension of the great problems of life; he is everywhere an annoyance and a nuisance. The profane babbler has some knowedge, but he dislikes all spiritual truth. He rejoices in iniquity, but not in the truth He is reckless and malignant.

Science may be considered as a species under the genus knowledge. Although science is derived from a Latin word, which means knowledge, all knowledge is not science. If it were, all men would be scientists. Science is knowledge, organized into a system. If it is doubtful, such knowledge cannot be considered science. Paul taught Timothy to avoid false science, which teaching implies that he should not avoid the true. False science also implies, that there is science which is true. The false science referred to by Paul, was the doctrine of endless genealogies and certain speculative questions which have no right to the appellation science.

The hypothetical sciences, which assume certain premises, from which the conclusion must necessarily follow, are only indirectly related to religion. The certainty of the science has nothing to do with any fact, but comes from the necessary relations of thought. The premises are based upon the intuitions of the human mind; and these intuitions point back to an intelligent *author* as an adequate cause for a marvelous effect. A mathematical conclusion is only reached by demonstration, and this has blinded the eyes of some mathematicians to the moral force of facts, and has been an occasion of skepticism. It was this species of narrowness that led in the pathway of infidelity, the celebrated La Place. A specialty is very dangerous, when it causes a man to ignore all other truth. A philosophical astronomer has said that an undevout astronomer is mad. Why this? Because the heavens declare God's glory, and the firmament showeth forth his handy work. The skeptical mathematician places the universe under absolute laws; but what astronomer can predict, with absolute certainty, that an eclipse will take place at a certain time next year? Might not a new comet, with a tail as long as its circuit, come in, and leave the demonstration as idle figures on paper? The forces of nature depend upon a will which can suspend them when thought proper.

It is to my mind self-evident that intelligence and will lie among the materials of science, as thoughts among the pages of a book. It is claimed by the skeptic that the uniformities of nature without which there could be no science, precludes the idea of free will. We do not think that such is the case. But, on the contrary, the uniformities of nature are a proof of the personality and freedom of their author. God has so constituted man that he naturally expects uniformity in nature; so the philosophy of man and the science of nature perfectly harmonize.

Personality and free will are indicated in nature, because natural science itself shows that science has not always been possible, for nature's uniformities have not been permanent, but have changed through different epochs. Geology points to a beginning not less emphatically, than do the Scriptures. To a beginning she goes back, and becomes silent. Science also teaches us that, after the beginnings, there were periods when science was impossible. There could be no science, when the earth was in a chaotic state; when the water swept unchecked over the mountains; when the mighty Saurians were monarchs of all they surveyed. What science would there now be, if the earth were

riven, and the wide Pacific and the majestic Atlantic were to pour their waters upon the great internal fiery ocean of which geologists speak? The different species now upon the earth, are manifestations of the Creator's wisdom and power; for they are not the result of progress in a perpetual circle, but were created by Jehovah.

Faith presents truths of which natural science is ignorant. What does science know about love, the most potent power in the universe? The true, the beautiful, and the good, antedate all science. The great difficulty with the physicist is his narrowness; he concludes that there is no truth beyond his specialty, and disqualifies himself for a judge of other truths. Even the astronomer is ignorant of the great movement, which is sweeping all—sun, moon, and stars to the far eastern goal to which everything is tending.

CHRIST IN THE INTERMEDIATE STATE.

BY REV. J. I. SWANDER, A.M.

Some of the thoughts now seeking to clothe themselves in the paragraphs of this paper have already found public expression in another form. It is deemed proper, however, to reproduce the same, with such changes in sentiment and phraseology as seem to be required by the writer's modified apprehension of the truth. The man who denies both the necessity and possibility of changing his own views has no right to preach the philosophy of progress to the world at large. Such progress is constitutional in the mind itself, as well as in every legitimate sphere of mental activity, and will so continue until science reaches that attainable point in history when all knowable truth shall be understood by man, even as man is already now apprehended by the personal Fountain of all truth.

Perhaps there is more room for progress in the science of theology than in any other department of human inquiry and knowledge. Not that theology has less truth than its sister sciences, but because it is more profound and sublime, and has to do more directly with principles, and the application of principles that lie either along the border, or within the sphere of the supernatural. Besides, theology, while it reflects a more supernal light than the vestal virgins of less sacred fires, is obliged, at times, to suspend its own progress until the auxiliary sciences have trimmed their lamps, that each may illumine the path of each other, and all move on in mutual friendship and advantage toward the coming of the Bridgeroom.

Such has been the case with the science of theology when confronted with the question of the *Intermediate State*. Without the light of a sound psychology it could not hope to master the difficult problem. But psychological science, owing to its unfavorable environments, was, itself, unable to advance with proper relief for its queen. Little was accomplished in the dark days. The scholastic philosophy was full of metaphysical distinctions; yet it brought to maturity no harvest of vigorous thought pertaining to the science of the soul. Mental philosophy fared no better under the reign of Cartesian doubt. Neither did it flourish under the Baconian method of induction. And when Locke projected his silly system of experience as the only testimony to the truth, the science was either hampered by empiricism, or schooled for the more severe embarrassment awaiting it in the phenomenal gospel of materialistic infidelity.

But Providence has recently ordered an advance along the line of earnest inquiry into the science of the human soul. These inquiries have not been satisfied with a supposed knowledge of the soul's faculties and forces: They have pressed themselves beyond the sphere of the phenomenal to discover and affirm the organic entity of the soul itself, and emphasize the substantial nature of its essential being. For this last and advanced position, the science will ultimately be compelled to acknowledge its partial indebtedness to the *Problem of Human Life*, by that daring metaphysician, A. Wilford Hall, Ph. D. Yet Dr. Hall is not the only man who, during the last few years, has pressed such vigorous psychological thinking in the right direction. The fertile genius of Germany, the practical energy of the Anglo-American race, the ripest scholarship of the world and the most rational faith of the Church have been moving in converging lines (though at times unconsciously) toward the same objective point. If Wilford got there first, it was because he preferred not to travel by molecular motion. Yet his early arrival was no more the result of his superior skill as a scientific explorer than the effect of favorable circumstances, happily combined in the selective wisdom of Almighty God.

Corresponding with this progress in psychology, there has also been an advance in the way of sound theological and Christological thought. Hades had been too commonly identified with perdition, purgatory or the grave. The question of the peculiar *condition* or *state* of human beings consequent upon the separation of soul and body was too generally either confounded with that of the *place* or *locality* of the departed, or submerged into the very different question of *rewards* and *punishments*, according to the moral characters, respectively, of such departed. But a new interest has been awakened in this subject, and a new direction taken by the inquiries thus stimulated. As usual, Germany leads the way. Ebrard and Dorner are among the advance guards. Bright theologians throughout the world are alive to the important movement. New England theology no longer elevates the external organ of its sensitive olfactories at the mere mention of the word which formerly seemed to savor more of sulphur than divinity.

Indeed the way is now thronged with pious pilgrims and scientific adventurers, who wish to explore the valley which intermediates between death and the resurrection of the body. Believing that the soul is an organized entity, substantial in the essence of its being, and independent of this tabernacle, we join the eager throng, and look with pleasure upon the land of Beulah, where, amidst the flowers and fruits of Paradise, our sainted friends have pitched their hadean tents, and now wait in hope for that *greater* "glory which shall be revealed in us" all, when, "in the resurrection at the last day," "Christ shall change these vile bodies, and make them like unto His glorified body, according to the working whereby He is able to subdue all things unto Himself."

But science alone, with all the possibilities of its progress, can never open the apocalyptic book of seven seals, and bring to light the hidden contents of the intermediate state. This power is vested in Him who liveth and was dead. The Lion of the tribe of Judah prevails to open the book; and true science joins the four and twenty Elders as they bow before the Lamb to sing the "new song": "Thou art worthy to take the book, and to open the seals thereof: *for thou wast slain*" —Rev. 5:ix. Christ's person is the key to the

enigma of the universe, and His death the solution of all the problems within the veil. The entrance of sin into the world, and the entailment of its mortuary consequences upon the world, made it necessary for Christ to pass, in a real historical way, under the dominion of death in order to unseal that great book of futurity whose most interesting contents are to be found immediately over the border of this present life.

This view is taken from the truly Scriptural and scientific standpoint of *organic redemption*. It centers in, and flows forward with, the entire history of the Christ, on a line parallel with the forces at work in the history of abnormal humanity, until both powers meet in the realm of death, where death is swallowed up victoriously. Otherwise there would have been no "path of life" leading to "fulness of joy": neither could our God have "gone up with a shout." The Bible is full of this Christocentric theology. The logic of any opposite theory holds its premises and conclusions within the mechanical compass of dry abstractions. However plausible it may appear, its syllogisms are full of fallacy, and its pious platitudes full of emptiness. Divine consistency is not the key to the atonement. Neither does God save the world for the sake of the mere agony of His suffering Son. His death involves more than the tragedy of the Cross. Golgotha was the gate-way to the Satanic citadel beyond. The last scene in the dark drama was executed behind the sombrous curtain. Christ's heel was bruised on Calvary, but the serpent's head was not effectually crushed until the promised "seed" had passed "from Edom, with dyed garments from Bozrah," to invade the serpent's headquarters. Thus did He wrest "the keys of death and hell" from him who had the power of death (Heb. 2:xiv). Thus, too, was the Gospel preached to them that are dead, making it possible for all the sainted "spirits in prison" to "pass the crystal ports of light, and dwell in endless bliss."

This is not "another Gospel," but the faith delivered already to Old Testament saints. The twilight prophecy of *such* a coming Conqueror tinged the horizon of the patriarchal age. Abraham foresaw the day of Messianic triumph, and was glad. David embraced the primitive promise, and expressed his hope of deliverance from the power of death (Ps. 16). Peter was able, under the baptism of Pentacost, to draw more meaning from David's language than what was clear and distinct in the inspired faith of the Psalmist at the time of its poetic utterance. Neither did St. Peter embrace this great truth at once in all its plenary significance. He continued to advance beyond himself, or, rather, was carried forward by the objective power of the concrete truth, until his higher inspiration and his consequent deeper penetration enabled him to see David's Lord and Son invade the mystic realm of mortality and preach deliverance to the captives (I. Peter, 3:xix).

Thus did the concrete and objective Gospel start with the development of the race, and move forward in the central channel of human history. The panorama of its successive and inseparable scenes passes continually before the restless audience of fallen humanity, revealing a supernatural power for the very purpose of generating and developing, in each obedient individual, the supernatural organ of faith, through which its saving benefits may be apprehended, its proportions surveyed, its beauties admired, and the personal Fountain of its excellencies adored. Such an exhibition leaves neither room nor relish for the unsavory hash of disjointed abstractions. Faith requires "that which every joint supplieth" in an organic way. If legitimately begotten, it will seek a comprehensive view of all the sections in the past, present, and future of one grand, progressive mystery, until, before its raptured vision, "hell shall ope its dolorous portals to the peering day," and the ransomed "spirits in prison" march forth to swell the old triumphal shout of prophecy: "Lift up your heads, ye gates: and be ye lifted up, ye everlasting doors, and the King of Glory shall come in."

What a solemn, sacred enigma confronts us in the "three days" of transition from the cross to the Redeemer's resurrection! Christ was really dead—His soul was separated from His body. This state of separation was His intermediate state. The "corn of wheat" had fallen into the ground that "the law of the spirit of life in Christ Jesus" might germinate the promised "seed" into a glorified humanity, "free from the law of sin and death." This involved the conflict with principalities and powers. What a significant and far-reaching victory! A dead Christ had more commanding influence over the elements of His abode than had a living Jonah when he "cried out of the belly of hell." Jonah prayed; Jesus preached. His preaching was not so much a proclamation of a power beyond Himself as a demonstration of the power He had in Himself—"the Lord, strong and mighty in battle." The sermon in the sanctuary of hades, on that last significant Sabbath in the calendar of Judaism, was nothing less than the power of His personal presence in the intermediate state. Its eloquence was "in the demonstration of the Spirit," and told powerfully in breaking the bands of captivity for the pious dead. Neither were its effects confined to the abode of spirits: "The graves were opened, and many of the *bodies* of the saints which slept arose, and came out of the graves after His resurrection (Matt. 27:lii). This was a prophetic result of the descent into hades. It points both to the law and the fact of a general resurrection.

Under this view of Christ's mission "into the lower parts of the earth," His resurrection appears as the *fruit* rather than the achievement of His victory. When Jesus cried with a loud voice it indicated "the greatness of His strength." In that strength He entered the realm, extracted the sting, and exhausted the power of death. Having thus "abolished death," He reached that turning-point in His eventful history when "death had *no more* dominion over Him." Having captured captivity, He lead it captive. "Having spoiled principalities and powers, He made a show of them openly" (Col. 2:xv). Having been confined as a willing captive in the city of the dead, He arose in the midnight hour of human history, and, with more than Samsonian might, plucked up the pillars and carried away the gates of the hadean metropolis. No wonder that "our God has gone up with a shout!" No wonder that the apostles preached Jesus and the resurrection with such enthusiastic emphasis! "It is Christ that died; yea, rather, is *risen* again." The reunion of His soul and body, and His reappearance as "the first fruits of them that sleep," are facts which furnish a strong consolation. This view of the Gospel reveals the firmest foundation for the unwavering confidence of Christian faith, the finest philosophy for the soaring aspirations of Christian hope, and a more immortal realm for the superlative powers and charms of Christian charity.

FREMONT, OHIO.

THE LAW OF MIND.—No. 2.

BY REV. J. W. ROBERTS.

As this number of THE MICROCOSM may be read by some who have not seen the former copy, I give a brief epitome of the arguments, or the conclusions reached from the arguments, which have gone before.

Matter is inert, helpless, can do nothing.

Matter can impart nothing that it does not possess.

In its essential principles, matter is now what it always has been, and always will be.

Matter does not possess ACTIVE FORCE, *and therefore cannot impart it to other substances.*

Matter does not possess LIFE, *and hence, cannot communicate life in any direction.*

Matter has no INTELLIGENCE, *and having none, can bestow none.*

Growing out of these axioms, we have this inevitable conclusion: "*What matter does not, and cannot now do, it never did, could or can do.*

This disposes of the *nebular hypothesis*, which Herbert Spencer and others adopt as a philosophical method of accounting for the universe; for matter in a nebulous state or condition, possessed no properties in the least different from matter in the same condition now; consequently, it was an utter impossibility for it to generate any active force, vitality or intelligence, which could operate upon itself to modify or change its nebulous or gaseous condition in the slightest degree. This is self-evident.

It is in agreement with these essential and fundamental principles that Newton formulates his three laws of motion, as follows:

1. "Every body continues in its state of rest or of uniform motion in a straight line, except in so far as it may be compelled, by impressed forces, to change that state.

2. Change of motion is proportioned to the impressed force, and takes place in the direction of the straight line in which the force acts.

3. To every motion, there is always an equal and contrary reaction; or, the mutual actions of any two bodies are always equal and oppositely directed in the same straight line."

Newton thus most emphatically asserts the helplessness of matter even to diverge a hairs-breadth from a straight line, and that all motion of matter arises from external forces acting upon it. In view of these obvious facts, it is plain that *spontaneous motion, life or intelligence never could originate in matter.*

Having thus, by the mere statement of self-evident principles, and the facts which necessarily grow out of them, shown that matter is incapable of producing the multiplied phenomena of nature, visible and invisible, all around us, the next step in the inquiry naturally presents itself, which may be stated in the following axiomatic form:

No creature, entity, or being can give or communicate that which it does not possess. Hence, no class of things or beings in the countless multitudes of creatures on earth, or in the heavens, from the moneron to man, *can rise out of its own sphere, or above its level.*

It requires but a moment's reflection to perceive the self-evident correctness of this law of limitation; for if any creature can rise one atom above its own level, then it *creates that atom*, and if it can create one atom, it can create two, or a million or a world. Nothing can be plainer than this. Professor Hæckel gives this immutable law in another form, but the essence is the same. He says:

"There appears, indeed, to be a limit given to the adaptibility of every organism, by the type of its tribe or *phylum.*" Example: "No vertebrate animal can acquire the ventral nerve-chord of articulate animals, instead of the characteristic spinal marrow of the vertebrate animals."—*Hist. of Creation*, Vol. I., p. 250.

Now it follows as a *necessary* result of this law that no order or species ever did or ever can get out of its own sphere or "phylum." Hence no aid can be given from a lower order of beings or organisms to those of a higher order, and the former cannot by any possibility assist the latter to develope in any direction, either by adding new faculties or improving old ones. It also follows, as equally demonstrated, that no species has ever developed its own order of being. The moneron of to-day is essentially the same in all respects as its first ancestor in the past ages; and so of every other species of insect, animal, beast, bird, reptile or other living organism. This must be so, for if a lower order of creature could by any possibility communicate to one of its own species, or to one of a higher order, *any quality which neither possessed*, it would be clearly a case of *creating something out of nothing.* It matters not how infinitesimal the increased advantage might be; for, as previously stated, that power or intelligence that can create an atom, can create a world; and hence the being, small or great, that can add the smallest imaginable amount of *actual increase* to another becomes a creator, and by the addition of an atom demonstrates its ability to develop a universe. There is no escape from this conclusion.

Mr. Darwin says: "Natural selection acts only by taking advantage of slight successive variations. She can never take a great and sudden leap, but must advance by short and sure though slow steps."—Origin of Species, p. 156.

There is not the slightest reason for this excessive caution; for, as just seen, the being that could make even the *slightest change, if it added anything to what already existed*, could leap the widest chasm—indeed, could have *no limit set to its achievements.*

Lest some may suppose that I have forgotten the forces of nature, gravity, electricity, magnetism, etc., I will state that I have neither forgotten nor overlooked them, but that they will all receive attention as the investigation of the subject proceeds.

Heretofore the subject under consideration has been discussed from a physical standpoint mainly, and the inadequacy of matter to produce the phenomena of nature has been clearly shown. As previously stated, we have found *active force, life*, and *intelligence* to exist as potential factors in the affairs of the universe. Matter possesses none of these, and hence cannot impart them, and never could have imparted them. Therefore there is—*must be* something in the universe which has these qualities and can impart them; for the law which runs through all nature is that *the less cannot contain the greater, but the greater must contain the less.* And this law, which demonstrates all that has here been stated about lower orders developing into higher species, also proves that there is a higher intelligence than that possessed by any finite creature. This is an inevitable conclusion of logic.

Herbert Spencer terms this ultimate source of all things the "unknown and unknowable," but in the world at large the name GOD is applied to this great Author of being, material and immaterial.

That mind exists is as self-evident as that mat-

ter exists. In their irrational efforts to disprove the existence of mind, men have been driven by the inevitable force of their own logic to deny the existence of anything, and assume that all which appears to exist is an illusion, a fancy, a chimera; that we *imagine* things do exist, and to us this imagination is the essence of reality. But these philosophers strangely forget to tell *where the fancy or the imagination comes from*, which possesses such wonderful powers! How strange that men of great ability render themselves ridiculous by attempting to disprove the existence of an all-wise and all-pervading Intelligence as the cause and governor of the universe!

If there is any one fact that an intelligent person *knows* it is the ego, *I am*. From this center all other knowledge radiates. It is the beginning of all intelligent inquiry. This being conceded, the query arises—whence came this intelligent property of being? As has already been shown, neither matter nor inferior intelligence could impart it, because they had it not to impart. It could not impart or create itself. This is self-evident. Then is it not equally evident that it is derived from some source of intelligence higher than itself? Certainly; for it is always the greater that contains the less; and the adverse of this proposition is a self-evident impossibility. Hence the incapacity of matter and the inability of minor intelligence to create the major, demonstrates the existence of a higher intelligence, as before made obvious.

This conclusion conflicts with no principle of science, philosophy, or reason. It perfectly accords with all our knowledge of material or immaterial things, with our personal experience and all the phenomena of being around us; and, though it is beyond the grasp of our finite powers of reasoning, and cannot be demonstrated as a mathematical problem, yet it is not contrary to, but in perfect accord with reason, and susceptible of the clearest logical demonstration.

The existence of all imponderable substances have to be determined by their effects. They cannot be sounded with line and plummet. Mathematics are powerless to measure them or their effects, except to a limited extent; yet no one is so unphilosophical as to deny their existence because of their intangibility, though a wide diversity of opinion exists concerning them. Why not be equally rational as to the existence of an all-wise Intelligence, whose effects are visible everywhere, in all places and at all seasons?

Having reached this point, and this paper being too long to enter upon a new line of thought and argument, the realm of mental phenomena is left for future investigation.

ELECTRICITY THE MOTOR POWER OF THE SOLAR SYSTEM.—No. IX.

BY B. T. KAVANAUGH, M.D., D.D.

EFFECTS OF ELECTRICITY ON MEN AND ANIMALS.

This article, as heretofore promised, will be devoted to the consideration of the influences of electricity and magnetism on the mental and physical organism of men and animals.

In the discussion of this subject, we shall have occasion to allude to the action of this subtile agent in a modified form. We purpose, therefore, for the benefit of the unscientific reader, to define the terms we use:

1. Electricity proper, or positive electricity, derived from the sun, rests on the surface only, of solid bodies, and is thence thrown off without a circle.

2. Electro-magnetism is a mixture of the positive and negative formed in the lower atmosphere, and is the modified form in which electricity is taken into the lungs of animals, and into the circulating fluid of plants. It acts in a circle.

3. Magnetism is known as negative electricity proper, and is natural to, and resides in the earth. It is also found in magnetic iron or loadstone, and may be imparted to steel or other very hard metals, as in the magnetic needle, producing polarity. It also acts in a circuit.

4. Animal magnetism is believed to be an electric agency, residing in living animals, the force of which is kept up by supplies derived from the atmosphere through the lungs and the skin, and is claimed to be the basis on which mesmerism is founded.

In all these modifications, the first named, electricity proper, is the active principle.

That electricity enters into the animal economy, and performs an important and indispensable part in the physiological movements of the vital organs of the body there can be no doubt, as will appear from several considerations. 1. It is known that the torpedo and electric eel, with other varieties of fish, are so highly endowed with magnetic apparatus, that they use it, like a battery, to kill or shock their prey, and defend themselves from the attacks of their enemies by this power. Humboldt, in his exploration of South American waters, found the electric eel to possess this power to such a degree, that horses driven into the water to encounter them were often killed by the magnetic shock.

The electric sparks often seen upon the slightest friction from the backs of cats and other animals, are too common to be denied.

2. To be more specific, we have good reason for believing that the circulation of the blood in men and animals, is carried on chiefly through the attractive and repulsive forces of electricity. With every inspiration of the air, a certain amount of electro-magnetism is taken into the lungs, with the oxygen and nitrogen. With the blood it is immediately thrown upon the heart, which keeps that organ in a constant positive electric condition. The blood is also highly charged with positive electricity. As positive repels positive, upon the contraction of the left ventricle of the heart, the blood is sent off through the aorta and arteries to the farthest extremities of the system, driven by the repelling force of the electric current within it and positive condition of the heart behind it. Arriving at the capillary division of its course, where it gives off the elements of nutrition with which it is charged, it enters the extreme branches of the veins, in a negatively electric state, and is therefore attracted back to the heart, with the same force and speed with which it was sent out. To adopt any other theory than this, we find ourselves involved in inextricable difficulties.

It is admitted by learned physiologists that it would require a physical force of two hundred and forty pounds to drive the blood through the circulatory system with the rapidity with which it is known to pass. Now, if the blood was alone forced through the whole course of its circulation—the portal system and all—simply by the *physical force* of the heart's contraction, then certain inevitable consequences must follow; namely, the rupture of the arteries and capillaries of the whole system. The extremely delicate and attenuated condition of these ultimate branches of the system

could never be able to resist the physical pressure made upon them; especially when the force applied from behind had to drive the blood, not only through the delicate capillaries, but beyond these, still to force it on through the liver—a sponge-like formation—through which it must necessarily pass very slowly. These obstacles are too formidable to be overcome by the mere physical force of the heart, even if the vessels were able to bear the pressure.

I have known cases where the contractile power of the heart was measurably lost, and yet the circulation was continued for years, which could not have been the case had the driving force resided in the muscular power of the heart.

The question arises, if it is not the office of the heart to drive the blood in the whole course of its circulation, then what is its function? I answer, it performs an office to the circulation, similar to that the pendulum does to the clock. It measures and delivers to the aorta, in quantity and time, the blood necessary to keep up a uniform and unvarying current—measured in intervals as well as in quantity, The positively electric condition of the heart being alone the driving power on the arterial and the drawing on the venous side.

But the aid of the attraction and repulsion of electricity in the circulation of the blood, is of secondary importance when compared to the influence of the same agent upon the nervous system. On this subject Mr. Dods remarks:

"If we turn to man, and investigate the secret springs of his nature, we shall find that he is but the epitome of the universe. The chemical properties of all the various substances in existence and in the most exact proportions, are congregated and concentrated in him, and form and constitute the very elements of his being. In the composition of his body are involved all the mineral and vegetable substances of the globe, even from the grossest matter, step by step, up to the most rarified and fine. And, lastly, to finish this masterpiece of creation, the brain is invested with a living spirit. This incomprehensible spirit, like an enthroned deity, presides over and governs through electricity as its agent, all the voluntary motions of this organized corporeal universe; while its living presence and its involuntary self-moving powers cause all the involuntary functions of life to proceed in their destined course. Hence human beings and all animated existences are subject to the electrical law that pervades the universe and moves all worlds under the superintendence of the powers of the infinite Spirit.

"On this principle it will be plainly perceived that as man is subjected to the same common law that pervades the universe, so electricity is the connecting link between mind and matter. . . . It is the servant of the mind to obey its will and execute its command. It is through electricity that the mind conveys its various impressions and emotions to others, and through this same medium receives all its impressions from the external world. It is by electricity that the mind contracts the muscles, raises the limbs, and performs all the voluntary motions of this organized body. . . . The brain is the fountain of the nervous system, from whence it sends out its millions of branches to every part of the body. Indeed, the brain is but a congeries of nerves, and is the immediate residence of the living spirit. This spirit or mind is the cause of all motion, whether that motion be voluntary or involuntary. It wills the arm to rise, and the arm immediately obeys the mandate; while the very presence of this mind in the brain, even though wrapped in the insensibility of sleep, produces all the involuntary motions of the vitals, and executes the functions of life."

That the nervous system adapts itself to the action of the electric current seems clear from its very structure. The electric current first being introduced into the system through the blood, the nervous centers must obtain it from that fluid in its positive form. The distribution of the nerves along the arteries seems to have this object in view. There are lines of nerves along every artery, and none along the lines of the veins, as there is no positive electricity in them. Those which accompany the arteries extract the electricity from the blood and transfer it, by induction, to the brain. This accounts, in part, for the change of the blood from the positive to the negative electric state before it enters the veins.

The limit of space kindly accorded me will not permit further remarks here, but this subject will be continued in my next, which should be read in close connection with this.

MT. STERLING, Ky.

PROFESSOR TYNDALL WEAKENING.

BY CAPT. R. KELSO CARTER.

The professor has been lecturing again in the theatre of the Royal Institute, upon his own ground where his word is law. But be it noticed that he shows signs of weakening. Do not let any one anticipate very much; his move has been made only to the extent of publicly comparing the wave-theory of light with the emission-theory. This is not much, nevertheless it is a slightly-encouraging sign; for if he continues to compare them for any length of time, a few emissions from the *Problem* may succeed in undulating the truth before his eyes. It is a sign of weakening again, in that it is one step down from his lofty position of contemptuous indifference. In the course of the lecture he slightly alluded to the wave-theory of sound, when he reminded his audience that it was Dr. Thomas Young, his own predecessor in the chair of Natural Philosophy in the Royal Institute, in the first year of the present century, who finally overthrew the emission-theory. "Young," he said, "never saw with his eyes *the waves of sound*; but he had the force of imagination to picture them, and the intellect to investigate them. And he rose *from* the investigation of the unseen waves of air *to* that of the unseen waves of ether, his belief in the one being little if at all inferior to his belief in the other." Professor Tyndall is evidently possessed of a certain *esprit du corps*. He is the immediate successor of the man who annihilated emission, and he is the man who has elaborated and perfected that annihilation; all of which greatly enhances the difficulty attending any retrograde step on his part. But what an imagination Dr. Young must have owned! Prof. Tyndall admits that his own is not so vivid; for in speaking of the complex vibrations which a particle of air must describe under the impulses from the fifty odd instruments in an orchestra, he declares that his imagination is utterly powerless and "retires baffled" from the attempt to grasp the situation (*Lectures on Sound*, p. 257). Then, again, does he show any signs of weakening when he says that the learned doctor's belief in one was very *little* "*inferior* to his belief in the other?" Pray upon which was his immediate predecessor even a "little" shaky? Has the successor inherited the possible doubt? We fervently hope so. But this is not all. The "greatest living au-

thority on sound" seems desirous to specially pave the way for a future step: he directly endorses Dr. Hall in the idea that an absolute *entity* may have actual existence without possessing any of the ordinary properties of matter. Now this is something with a vengeance. He never remotely hinted at Dr. Hall's theory; but he couldn't have said more, in one way at least, to sustain the grand idea of "Substantialism." "He pointed out," says the account before me, "that the undulatory theory accounted for all the known facts in connection with the science of light [a pretty broad assertion]. It traced and illuminated paths through what would be otherwise the most *hopeless jungle of phenomena* in which human thought could be entangled. *This is why the foremost men of the age accepted the luminiferous ether, not as a vague dream, but as a real* ENTITY—*a* SUBSTANCE endowed with inertia, and capable, in accordance with the established laws of motion, *of imparting its thrill to other substances.*" Eureka! we are tempted to shout. Let Wilford take courage. Here is solid wisdom from a most unexpected quarter. What a tremendous support to the theory of *substantial sound*, &c., to be told by the "highest living authority" that a positive "entity," a real "substance," fills all space, permeating and circulating through solid bodies, as diamond, crystal, etc., which substance has no appreciable nor ascertainable weight, but which is "capable of imparting its thrill to other substances *according to the laws of motion.*"

What a blow we have here to Materialism! Something which is totally beyond and outside the senses is nevertheless capable of moving ponderable matter. "Ye Gods! it doth amaze me" to see a man, who, a few years ago, found "in matter the promise and potency of every form of life," now claiming the existence of intangible, ethereal, transcendental "entities." What a contradiction in terms from his standpoint! To be consistent, he will have to claim that all mind, all words, *all thought*, are substances, are real entities, for in so doing only can he hope to be entirely materialistic; but in so doing, what a spectacle it will present! Prof. Tyndall unconditionally surrendering to the very ideas formulated by Dr. Hall in THE MICROCOSM months ago! We cannot yet say that we are personally ready entirely to accept the idea that every thought is an entity, but we are certain that nothing else remains for the Professor, if he desires consistency. The latter jewel is one he seems determined to wear at any cost. In the same lecture, he stated that, "Young proved that by adding light to light, darkness could be produced; *just as by superinducing sound upon sound, silence could result.*"

He then performed the light experiment, but the "sound-upon-sound" was not performed. Now, can not Prof. Tyndall be persuaded to come to New York and perform that one experiment f orthe sake of science? The $5,000 offered by Mr. Goodrich so long will amply repay him for the twenty days' absence; and he can have a sea-voyage for his health, not to speak of the everlasting gratitude of the world if he will only *just once*, before a public audience, who have ordinary unscientific ears and no axe to grind, superinduce one sound upon another and thus produce silence. Will he do it?

In conclusion, the writer would like to ask Prof. Tyndall to allow him to appear upon the stage *in the Professor's presence*, and reperform the famous tin-tube experiment with improvements, as actually performed by the writer before the Institute of Science in this city a short time ago. The books were clapped and the light extinguished, just as Prof. Tyndall claimed to have done before the Royal Institute; but when the writer substituted for the books an immense gong-bell, making a noise like a city fire-alarm, the candle refused even to "duck," and when the books were clapped with their sides toward the mouth of the tube, so that no air could be pushed into it, the same disastrous result followed. Can the Professor undulate through this "hopeless jungle of phenomena"?

P.A. MIL. ACADEMY, CHESTER, March, 1883.

REMARKS.

Mr. Joseph Goodrich has just placed in our hands good collaterals worth $5,000 cash which we have now in our safe, to be held and turned over to any man who will produce silence by any possible combination of two unison tones, as described by Prof. Tyndall, in his great work on sound. Surely, Prof. Tyndall cannot refuse to do as Capt. Carter suggests, if he is a man of as much courage or honesty as he has been generally reputed to possess. The $5,000 prize is now ready for Prof. Tyndall. Prof. Mayer, or any other man who dare jeopardize his reputation by a public experiment. —EDITOR.

DR. KAVANAUGH'S REPLY.

In number Eight of Dr. Kavanaugh's very able series of papers on "Electricity as the Motor Power of the Solar System," printed last month, will be found a very respectful and argumentative reply to our brief suggestion of doubts in the November MICROCOSM. We fear, however, that the full force of our doubts has been missed. To make sure that the Doctor has not overlooked our ground of objection, let us briefly express it more clearly, if possible:

Now, if the earth is really carried around the sun, and thus deflected from a tendency to go off on a tangent or in a straight line, by the currents of electricity passing from the sun to the earth, or *vice versa*, then these simple currents of electricity must pull upon the earth, or push as the case may be, with almost inconceivable force. But so far as we are aware, electricity proper, whether positive or negative, in any terrestrial experiment, does not pull or push any object in the slightest degree by passing from one body to another. We believe, in fact, that all the electricity that can be forced through a wire would not pull or push the weight of a feather between the two objects thus connected. How, then, if this be true, could vast rivers or oceans of electricity, pouring from the sun upon the earth, stir this mundane sphere, much less pull it from a straight line at the rate of thousands of miles an hour? We know by experiment that electricity, however generated and conducted, produces no mechanical effect except through its secondary effect in first producing magnetism in some body capable of becoming a magnet. The earth, composed as it is of large quantities of magnetic substance, such as iron and other metals having similar magnetic properties, might very easily be supposed to become a powerful magnet, inclosed as it doubtless is, in an atmospheric helix of circling electric currents. This vast magnet might be supposed to attract bodies appreciably at least. But no experiment, so far, has shown that the earth magnetically attracts iron appreciably any more than wood or brass. The only magnetic effect produced by the earth is that upon the compass needle in turning it north and south. This

proves to most scientific minds that the earth is inclosed in an electrical helix, since a compass-needle, placed in a helix of insulated wire conducting a current of electricity will always, when free, take a position at right angles to the circling current. It was formerly supposed that the needle turned north and south because immense quantities of loadstone were located at the poles of the earth. But this gave way on the discovery of the helix and its action upon a magnetized needle. But it ought to have been abandoned before, in view of the great distance of the needle from the supposed deposit of loadstone, when we know that a mountain of iron does not perceptibly affect a compass needle a few rods away! Hence, Dr. Kavanaugh seems to admit that the earth and sun could not affect each other at all, magnetically, even if they were both solid magnets of steel, owing to their great distance apart; and consequently, he admits that the force exerted between them is not on the principle of *magnetic attraction*, but by virtue of the electric currents, positive and negative, passing between them. Then, if we are correct in our apprehension of the Doctor's reasoning, it would seem an essential factor in his premises that he first show by some sort of experiment, that the simple passage of positive electric currents between two bodies can move them or produce any degree of mechanical effect without first producing a magnet, and through such magnet, the dynamic force required by his theory.

As Dr. Kavanaugh does admit the existence of gravity by which a stone falls, and also admits that this same force may even extend to the moon, and, as we understand him, cause its orbital motion, we fail to see, for the life of us, what use there is of another force distinct from gravity to cause the earth's orbital motion around the sun! Here, we confess, we are completely in the dark. Why should there be two different ways of doing similar kinds of work in the solar system? Or does he deny the moon's orbital motion by gravity? Plainly, if gravity would deflect a cannon ball (its projectile velocity being sufficient), and make it travel in a permanent orbit around the earth, without the aid of electricity, as natural science teaches, and as Dr. Kavanaugh doubtless admits; and, if the same thing extends to the moon, as we believe, he has admitted in one of these articles, it would seem to require very conclusive proof to show that this system of "Motor power," which is sufficient for satellites, is not sufficient for planets.

Still we like the Doctor's persistent manner of urging the claims of his theory, and admire the logical and scholarly tone of his reasoning; and we believe his articles, if they do nothing more, will instigate thought, and cause hundreds of scientific men to open their eyes in a manner, and in a direction they never opened them before.

A SPECIMEN OF KIND WORDS.

We could give a hundred letters, similar in tone and enthusiasm to the one copied below from the Rev. Dr. Raby, as we get several in each mail we receive. But we dare not take the room. This one will have to speak for the rest:

WILFORD HALL:

Dear Doctor:—I have carefully read your wonderful book, the *Problem of Human Life*. Every page awakened surprise and excited gratitude to God and thankfulness to the author. Like as the Bible, when truly appreciated, begets a desire that others should become acquainted with its precious truths, so your *Problem*, which is a masterly defense of the *Book* of books, produces a similar feeling, and a wish that it may be as widely circulated as possible. Under this pressure, dear Dr., I have taken the liberty of copying, for insertion in *The Lutheran Observer*, from THE MICROCOSM, part of your extract from Rev. F. Hamlin's Thanksgiving sermon. I had never seen your *Problem* or MICROCOSM noticed in *The Observer;* and as this is the principal paper of the General Synod branch of our church, and the part with which I am identified, I felt mortified that we should be behind sister churches in recognising the great services your works are conferring upon the cause of science and religion. * * * * * * * Personally, I take great pleasure in recommending the *Problem* and THE MICROCOSM. I have often thought of expressing to you my heartfelt thanks for the glorious work you are doing in overthrowing the false religious and scientific theories. You are receiving appreciative letters from thousands of your subscribers, but there are other thousands who do not write to you, but who are just as heartily and enthusiastically with you, and who say Amen and Amen to the very highest encomiums upon your grand work. The *Problem* gives out no uncertain sound like the wave-theory, but rings the distinct funeral knell of false science in all its phases, and has proved the upper and nether millstones for grinding to powder every doctrine, theistic or atheistic, which gives to creation a lower origin than that recorded in the Bible. May God long continue your life and health! Other men are catching the inspiration from THE MICROCOSM. The Swanders, the Kepharts, the Van Dykes, the Hamlins, and others of like courage and discernment are coming to the front. The enemy's cannon have been spiked, his sword broken, and his very citadel is now undermined. Let no timid one fear. The rout will be complete, and the scattered, but once so defiant army of materialism, when finally dispersed, can never again be reorganized. Please excuse me for taking up so much of your precious time. Yours, with sincere gratitude,

KIMBERTON, PA. P. RABY.

"SIMILIA, SIMILIBUS, CURANTUR.

(THE OTHER SIDE.)

Editor of THE MICROCOSM:

I notice that in Elder J. G. Burroughs' article on "Redemption," in the February number of THE MICROCOSM, he makes the statement that "In the Science of Medicine there is no law better established than the homeopathic law—*Similia, Similibus, Curantur.*" The *regular* medical profession throughout the whole civilized world challenge him—as they have challenged Hanneman and any of his disciples—to his proofs. Until it is *proven*, it may not properly be termed *a law*. And while we will not deny the aptness of the illustration, we certainly think it was very poor taste to use it in a journal read by so many physicians of the *regular* school as is THE MICROCOSM. We were well pleased with the Elder's article in every other respect. Fraternally, DR. G. A. STUART.

PATTERSON, IOWA., Feb. 16, 1883.

☞ SEE the "extraordinary offer" on last page of this number.

WILFORD'S MICROCOSM.

23 Park Row, New York, April, 1883.

A. WILFORD HALL, Ph.D., Editor and Prop'r.

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SPECIAL NOTICE.

In our conduct of this journal we desire to give our list of excellent contributors the widest possible latitude for the conveyance of their honest convictions, so long, at least, as this liberty does not conflict with the general aim and scope of THE MICROCOSM. But we wish our readers definitely to understand that we do not hold ourself responsible for the views of our contributors, nor, in fact, even for our own views, as we are liable at any time to change ground on receiving more light, as we have done more than once since this paper was commenced. But, generally, we hope and aim to be consistent. EDITOR.

PERSONALITY OF GOD.

The first article in this number of THE MICROCOSM, from the pen of the Rev. T. Williston, M.A., our valued contributor of Ashland, N. Y., is remarkable for its individuality as well as for the studied and very careful manner in which, like all his papers, every sentence is written. Dr. Williston manifestly sends out nothing hap-hazard from his pen, and the reader may depend upon it, if there is any error in his positions it is one of deliberate misjudgment and not a thoughtless mistake. In other words, it is a *mistake* committed *purposely!*

He believes in the *personality* of God in the literal and absolute meaning of that term, as he has no sort of hesitation in declaring; that is, that God, individually, constituted with form and organism, and in His triunity of Father, Son, and Holy Spirit, resides in a definite locality in the universe, as absolutely and personally as a king dwells in his palace or reigns upon his throne. This we must regard as a most rational, satisfactory, and consistent position, as far as it goes; and one which can alone explain and account for the fact that God sees, hears, feels, thinks, acts, etc. But while thus bringing down His *personality* within the grasp of our comprehension, or at least conception, we doubt if it will satisfactorily account to thoughtful minds, as Dr. Williston leaves it, for His *omnipresence* or *immanence* in Nature, which we can conceive of only as an *existence* in some *substantial* or *entitative* sense of those terms.

'Tis true we can conceive of God's presence in the sense of intelligent cognizance or inspection in other parts of His universe distant from His throne, as a king's presence is recognized, through his agents, in different parts of his realm. But is this sufficient to fill the meaning of the scores of Scripture texts which speak of God as really and actually everywhere present? We doubt it. The sun has a definite location in the centre of the solar system, and is also *substantially* present throughout that system by means of its entitative light and heat. A bouquet of flowers might be definitely located upon the pulpit, and yet might be really present in every part of the largest church by the emanations of its substantial odor. So God may now be personally seated upon *Alcyone*, the centre of the Stellar universe, created and adorned for His presence, and from this blazing throne through His substantial attributes and exterior nature He may reach forth His hand and make His entitative being felt even throughout infinite space. The wondrous and ubiquitous forces of Nature, such as we see operating all around us, may be the substantial media and even exterior portion of His being through which His entitative attributes act and take cognizance of all events. Gravitation may be the channel of His

power, electricity of His vitality, heat of His love, and light of His wisdom, and all these, with other substantial forces that we know not of, may act as the real emanations of His personality, and in this substantial sense may He be *omnipresent*, while personally He may be only seated upon Alcyone's great central summit as the throne of the universe. What a grand conception! In a modified sense this may be illustrated by the teacher's presence extending to all parts of a school-room while directing by his eye and his voice the pupils engaged at the various branches of study; but he can only do this through the substantial media of sound and light without which his presence could not be made to extend a single inch from his personal organism.

In our correspondence on materialism with Dr. Hazard, of St. Louis, Mo., as published in the first three numbers of THE MICROCOSM, Vol. I., we took the same view of God's personality as that taken by Dr. Williston, with the exception of making the very *attributes* of God substantial, by which He may have an entitative omnipresence while personally limited to one particular part of His universal dominion. We copy below, as a specimen of our view then entertained, a paragraph from our second letter to Dr. Hazard as printed in the September MICROCOSM:

"But further: you can, as you admit in your first letter, conceive of an invisible, intangible, "all-knowing, almighty God," and consequently you have no trouble in "forming a mental concept" of the fact that He is capable of thinking, seeing, hearing, acting, creating, &c. But instantly your caution steps in, and you become involved "hopelessly in darkness" in attempting to conceive of Him as a *personal being located in one part of the universe*, but with *substantial attributes* extending "through all extent." My powers of conception, as I trust also my consistency, is the very reverse of yours. When I am able to conceive, as you do, of the existence of an "all-knowing, almighty God," I am forced to regard Him as a person, because all my experience is in that direction. I cannot begin to conceive of a being capable of thinking, seeing, hearing, feeling, working, unless He possess the actual personality and faculties which we know to be necessary for such mental and physical acts on our own part. But as we can, through our faculties and senses, take cognizance of many events and objects at a distance and entirely separated from our personal being, I have no difficulty in conceiving (though not comprehending) the possible existence of a personal being of infinite capabilities and attributes, who could see, and hear, and know, and feel, and operate throughout immensity of space, as readily as we poor finite mortals can recognize by our senses what is taking place a hundred feet away. If our human faculties were multiplied a million times in extent and power (which I can conceive, since we know they can be increased many fold), I could readily conceive of the possibility of a governor of a state sitting in his gubernatorial chair and passing under personal observation and supervision every event occurring throughout the entire state, as fully as he now observes and supervises what is going on among his clerks and assistants right in his own office. So if his faculties and powers were infinitely augmented, I have no difficulty in conceiving of his mental and *substantial presence* extending through infinite space, even though he might occupy a definite location as to his personal ego or self. I beg of you, doctor, to give your powers of mental conception a fair show, and I doubt not, by the time you reply to this letter, there will be no difference between us worth discussing."

By limiting God's substantial being to His *personality*, Dr. Williston finds a real difficulty in His creation or evolution of the universe from Himself; for how could God as a *person*, seated upon a throne, make this earth out of a part of His own personal organism without detracting from His perfection as an entitative being? Hence the necessity of supposing an insupposibility, that God created the universe out of nothing, or else admitting the eternity of matter, another insupposibility, in order that ready materials might be found out of which to manufacture worlds? All this difficulty, however, dissipates the moment we make the substantial forces of the universe the exterior substance of God's being, and out of an infinitesimal fraction of which, instead of "nothing," the material universe was condensed. This in no way infringes upon God's personality, and if this is *pantheism*, then make the most of it. It is a very mild type of that doctrine at all events, and we think one that the most ardent and spiritually-minded Christian might subscribe to without seriously damaging his standing in the most orthodox of the evangelical sects, so long, at least, as he openly avows his belief in a personal Father Almighty, maker of heaven and earth, and all that they contain. We do not propose that any orthodox man, who dares admit a personal, substantial, organized God, having eyes, ears, hands, etc., and located in a definite part of the universe, shall turn us out of the visible church for believing the same thing; and in addition to such infinite personality, that He is clothed upon with the substantial forces of Nature, as His exterior being by and through which His omnipresence can be logically maintained. Such a view makes God actually present everywhere without infringing upon His absolute personality, or limiting His immanence to a mere intelligent "inspection," while He himself is countless millions of miles away. We would rather, if necessary, be enough of a pantheist to make this earth itself a part of God's exterior nature, than to believe that there is no God nearer to us than the Pleiades, even though He might see and hear us at that distance. But it is not necessary even to come that near pantheism since the intangible but substantial forces of Nature, which pervade immensity, answer every purpose, and would be a fitting extension of God's essential being, since the Bible teaches us that He clothes Himself with the light as with a garment, (Ps. civ: 2).

"PROBLEM OF HUMAN LIFE."

REPLY TO PROF. STRONG, BY THE AUTHOR.
(*From Zion's Herald, Boston*).

By permission of the editor, we offer the following remarks in reply to criticisms of Prof. W. C. Strong, which appeared recently in two numbers of this paper (ZION'S HERALD) upon that portion of the "Problem" which reviews and opposes the current theory of Sound. Having been requested by the editor to limit our reply to the smallest convenient space, it will prevent our noticing all, or even a majority, of the questions raised or statements made by the Professor. We shall, however, attend to the most prominent in such manner as to show what could easily be done with all had we room.

First, let us say, we are disposed to be charitable to the Professor. We know how to sympathize with him. A man bred in a certain scientific belief, and whose mind has run in a certain groove of thought from boyhood, and especially one who has taught a theory for years as scientific and indisputable truth, can hardly be blamed for using petulent language and unkind epithets toward an innovator who seeks to overturn such a long and well-established theory. Indeed, the feelings of a professor who sees the theory he has so long taught and so implicitly believed in, ruthlessly attacked and shown to be ridiculous, and its absurdities pointed out to the derision of all honest students of science, can scarcely be imagined, much less described; and unless he is governed by a well-balanced Christian temper and a profound love for the truth, it is impossible to expect from him a calm or dispassionate reply to arguments so antipodel to his life-long views. As a consequence, we see in the articles under consideration a degree of ill-temper, as expressed in reiterated epithets such as "ignorance," "stupidity," "charlatanism," etc., that is not calculated to make one hopeful that such a critic is susceptible of ever learning anything that he does not already know, however much he may be in the dark. We are therefore disposed to forgive all his unkind flings, and in return to give him something in the shape of genuine scientific argument, which, if he is too deeply surcharged with prejudice to comprehend, the readers of the HERALD will not fail to grasp.

Let us now look calmly and critically at some of his more plausible objections to our arguments against the wave-theory of Sound. In our book we, of course, deny that sound is heard by the *vibration of the tympanic membrane*, upon which the very existence of the wave-theory depends. This position Prof. Strong vigorously attacks, because he knows full well, according to the old theory, that the only object of wave-motion in the air is to produce a corresponding wave-motion in the drum of the ear, and in this way convey a similar wave-motion to the appendages of the auditory nerve, and along this nerve to the brain, where, as Prof. Tyndall expresses it, these vibrations of the tympanic membrane "are translated into sound." Any person who is at all familiar with the standard works on Sound, such as those of Tyndall, Helmholtz and Mayer, the three greatest living authorities, knows that they teach, and reiterate it over and over, that the office of the tympanic membrane is to "*bend once in and once out* as each sound-wave strikes it." This is the foundation of the theory, and this doctrine we emphatically deny, as elaborately argued in the "Problem," that this membrane is not intended by nature to vibrate at all; and that should it so vibrate sympathetically, as the effect of sound, it can only respond to one single pitch or tone—a unison, or within a small fraction of a unison. This is clearly taught by Helmholtz himself, as we will soon show. But Prof. Strong, seeing the fatal nature of our position if correct, feels that it must be broken, or the wave-theory itself breaks down. Hence he makes his strongest effort upon this point, and claims that the tympanic membrane must and does vibrate to sounds of every pitch, or he virually admits the wave-theory broken down. To prove his position, he presents an experiment of a small membrane stretched across one end of a paper tube, and says if we speak into the other end, it will cause a beam of light, falling upon a small mirror attached to the membrane, to dance to and fro upon the wall of a darkened room. While this is all true, and without regard to pitch of voice, it shows that Prof. Strong is totally uninformed upon the question he attempts to discuss. This case is stated and explained in the "Problem" in the very argument he was attempting to criticise. Why did he not see it and give it to the reader?

Let us explain it again. Such vibration of a membrane by speaking or singing in close proximity to it, is not caused by the sound at all, but by the air-waves which are *incidentally* produced and sent off by the vibratory motion of the sounding body. This sounding instrument, whatever it may be, not only produces sound-pulses, which pass off through the air as the sound-conducting medium by a law of its own, analogous to that of electricity, but it also produces air-waves incidentally which are driven off for a short distance, and which will force a membrane into corresponding vibration whether it be in unison with the pitch of tone or not. But such air-waves are no more part of the sound itself than the tremor of the dynamo machine, or that of the surrounding air is a part of the electric current that passes off at the same time through the conducting wire! No one but a most superficial investigator could so carelessly confound the two classes of phenomena, especially after seeing this very explanation, as he must have seen it in the book he essayed to review.

Now, the only way sound can affect any object, such as a membrane or string, so as to stir it at all, is by *sympathetic vibration*. This, the acoustical world knows and teaches; while all authorities know and teach that this sympathetic vibration cannot be produced in a string or membrane that is not in unison, or very nearly in unison, with the exciting tone; or, as Helmholtz expresses it, that has not the same vibrational number. This, of itself, demonstrates that the forced vibrations of a membrane, in close proximity to a sounding instrument, of which Prof. Strong so learnedly speaks, are not caused by the sound at all, but by the incidental air-waves generated by the same vibratory motions which cause the tone! Can we now prove by the highest acoustical authority in the world that sympathetic vibration can only occur as we have stated? If so, our case is made out, and tympanic vibration, as the means of hearing sound, is totally overthrown. Here it is from Prof. Helmholtz himself, in his great work, "The Sensations of Tone:"—

"The intensity of sympathetic vibration with a semitone difference of pitch is only one-tenth of what it is for a complete unison. . . . Hence, when we hereafter speak of individual parts of the ear vibrating sympathetically with a determinate tone, we mean that they are set into strongest motion by that tone (unison) but are also set into vibration less strongly by tones of nearly the same

pitch, and that this sympathetic vibration is still sensible for the interval of a semitone."

Thus, plainly, the membrane of the ear cannot vibrate to a sound that is not in unison, or nearly in unison, with the vibrational number of the membrane itself, according to its size and tension. Strange as it may seem, this highest living authority on sound, thus at one blow annihilates the wave theory by overthrowing tympanic vibration; but he did not notice the fatal self-contradiction, because he was then discussing Corti's arches, another branch of the subject. But here is another proof still plainer from the same authority. Speaking of the sympathetic vibration of a tensioned string, caused by singing to it, he says :—

"The more exactly the singer lifts the pitch of the string, the more strongly it vibrates. A very little deviation from the exact pitch fails in exciting sympathetic vibration." ("Sensations of Tone," page 61.)

Thus breaks down tympanic vibration, and with it the wave-theory itself at the hands of its ablest defender ; for if a musical string will not vibrate by singing to it unless the "singer hits the pitch of the string," then manifestly a tiny untensioned membrane, not adapted at all to producing sound, will not vibrate to any pitch by sympathy, much less to all pitches ! (Q. E. D.) Had Prof. Strong been conscientiously desirious for the truth alone upon this matter, he would have tried speaking or singing to his stretched membrane in a moderate tone of voice a few rods away from it, to see the beam of light dance ! Though an ear would hear his voice and words distinctly ten times as far away, yet no dancing will take place, as he could easily know if he so desired.

As sound is not heard by tympanic vibration, and consequently does not consist of air-waves, it can only be constituted of an immaterial substance analogous to imponderable, intangible odorous corpuscles, and conducted through various media by laws of their own, analogous to those which conduct the substantial currents of electricity. If the substantial but imponderable corpuscles of odor produce the sensation of smell by actual contact with the nasal membrane, and without any vibratory motion of that organ whatever, as Prof. Tyndall admits, is it reasonable to suppose that Nature made such a prodigious leap, in going to the next higher sense (hearing), as to institute an entirely different process of affecting its membrane? The undulatory theory of light was urged by its originators in the time of Newton because wave-motion of the air caused hearing—as no one then thought of questioning—and they urged that it was unreasonable to suppose that Nature should entirely change the process of addressing our sensations in passing from hearing to sight ! "Out of thine own mouth will I condemn thee."

We have thus given special attention to this chief and underlying principle of the wave-theory, that its very foundation may be seen to be wrong. In our next and concluding paper we will briefly set aside the other chief points of Prof. Strong's criticisms.

A. WILFORD HALL.

23 Park Row, New York.

[N. B. The second reply to Prof. Strong in *Zion's Herald* will appear in next month's MICROCOSM.—EDITOR.]

IMPORTANT : We are now electrotyping the first volume of this journal in pages uniform with this to be bound in cloth and sent by mail at $1. per copy. Who wants it ?

TYMPANIC VIBRATION.

In the foregoing article, written for *Zion's Herald*, we were so limited for space that we could not show the fallacy of tympanic vibration and its total impossibility, by quoting from very recent physiological writers. Since our work on sound first appeared, in 1877, it is a gratifying fact that several anatomists and physiologists of high standing and scholarship have taken up the investigation and shown the complete unreliability and worthlessness of the pretended analysis of the human ear by Helmholtz, and the folly of the superficial repetitions of the same views by Tyndall, Mayer, and other physicists whose works on sound and the human ear are standard textbooks in our schools. Let us now give a couple of these proofs in confirmation of our original position against the wave-theory, and thus show the shallowness of the very foundation of the old doctrine of acoustics, namely: that the tympanic membrane vibrates to and fro in response to the impact of air-waves.

We copy the following extract from an able article on the human ear in the Chicago *Medical Times* of June, 1879, written by Prof. Henry Olin, M. D., a noted Professor of Otology and Ophthalmology in the Bennett Eclectic Medical College, of Chicago. This writer says :

"It has long been supposed, and is yet thought, that the tympanic membrane vibrates from the action of sound-waves, and that its presence is essential to hearing; but such is not the case, as I shall attempt to show in this brief article. In the first place, persons born without a tympanic membrane hear as readily as those with one. And again, the absence of it does not produce deafness where the cavity of the drum is not changed by disease. The *membrana tympani* is not elastic, but is an absolutely inextensible membrane, chiefly composed of tendinous fibers. Its curved form renders it essentially different from all other membranes hitherto studied in acoustics. It will be seen that it is a concavo-convex membrane, and cannot vibrate without dislocation, and, being of a fibro-tendinous character and inelastic, would, by its vibration produce such a crackling sound that all other sounds would sink into mere nothing compared with the sounds itself would produce, were it to vibrate as physiologists tell us it does. I take the ground, then, that the object of the tympanic membrane is not for the purpose of vibrating and conveying sounds to the auditory nerve; but for the purpose of collecting sound, and also as a protection to the cavity of the drum, the same as the eye-lid is a protection to the eye-ball and its delicate mucous surface."

How true and rational is all this, and how perfectly does it contradict Tyndall, Helmholtz, and Mayer, as well as agree with the position so exhaustively argued in our *Evolution of Sound!*

But we have a still more emphatic indorsement of our view from the pen of that able physiologist, Prof. H. Raymond Rogers, M.D., in the October (1882) number of the *Journal of the Telegraph*, published in this city. Dr. Rogers says:

"Already the minds of thoughtful men are being freed from the iron dominion of the old theory of the mechanical action of waves of air upon the vibrating drum of the ear. The essential irrationality of the theory makes itself seen and felt. Men are now ready to listen to the fact that the '*drum*' of the ear is in no sense a resounding *drum*, beaten by waves of air. A membrane diminutive and flaccid, it would never have been supposed to play the part of a tense drum-head, except in blind support of a theory. The imagined vibratory action of the *membrana tympani* is a mechanical impossibility. Those membranes are not flat, as is popularly supposed, but funnel-shaped, with a depressed centre surrounded by sides gently convex outwards. They cannot therefore act like stretched membranes, and vibrate like drum-heads. And, too, the auditory ossicles are so attached to those membranes as to be subject to a synchronous vibration. This is impracticable. These facts alone are sufficient to destroy the accepted theory of sound."

No man can read these two concurrent statements of facts, by practical and candid investigators, thus thrown into the very teeth of Helmholtz and Tyndall, and not acknowledge the correctness of our original attack upon the air-wave theory of sound. Now, what say those great writers and the thousands of professors of physical science in our colleges and universities who, following the lead of Helmholtz and Tyndall, are at this very time drilling their classes of young men in the nonsense of tympanic vibration as the means of hearing sound, and thus expounding the wave-theory as based upon that supposed fact?

In the light of the foregoing extracts let us now quote the following sentences from the two greatest living names in science, and leave the reader to his sober reflection.

"A periodically oscillating sonorous body produces a *similar periodical motion*, first in the mass of the air and *then in the drum of our ear*, and the *period of these vibrations must be the same as that of the vibrations of the sounding body.*"—*Helmholtz: Sensations of Tone*,—p. 16.

"Thus is sound conveyed from particle to particle through the air. The particles which fill the *cavity of the ear are finally driven against the tympanic membrane*, which is *stretched* across the passage leading to the brain. This *membrane*, which closes the drum of the ear, *is thrown into vibration*, its *motion* is *transmitted to the ends of the auditory nerve*, and afterwards along the nerve to the brain where the *vibrations are translated into sound.*"

"Thus, also, we send out sound through the air, and *shake the drum of the distant ear.*"

"Every *wave* generated by such vibrations *bends the tympanic membrane once in and once out.*"—*Tyndall: Lectures on Sound*, pp. 4, 5, 69.

WHY DISCUSS THE SOUND THEORY?

The Rev. Dr. Swander writes us that the sound-question is the real battle-field of THE MICROCOSM, and tells us not to let up on it as long as one college or university in this land clings to that already exploded monstrosity of science. He assures us that the paramount mission of this magazine is firmly to establish and then vigorously to maintain *Substantialism*, till the last vestige of materialistic philosophy shall have died out and disappeared; and that to do this effectually is to break down this strongest stronghold, and this representative "*mode of motion*" of physical science.

There is not, he thinks, an intelligent and candid atheist or materialist living who would not at once admit the soul to be an *entity* instead of a "mode of motion," if sound, the most unquestionable of all modes of motion, were proved to be a real substance. A man's materialism, under such conviction, would instantly vanish into something very much thinner than air-waves.

With the wave-theory of sound which has stood unchallenged for so many centuries, wiped out of existence, down would go the undulatory theories of light and heat built upon it, and with them must necessarily explode the materialistic doctrine that the life of man is but a mode of molecular vibration, or a delicate oscillation to and fro of the brain-particles, and, as infidel science teaches, "*no more substantial than are the motions of the air-waves that we call sound*"! Let sound be demonstrated to be a substantial entity which follows absolutely if it be not a mode of motion, and at once all the forces of Nature fall into the ranks of *Substantialism*. All modes of motion must of necessity break down together, and with *sound*, *light*, and *heat* established as real entities, *electricity*, *magnetism*, *gravitation*, *life*, *instinct*, *mind*, *soul*, *spirit must follow*, *culminating in the God and Father of all* as the original fountain of vitality and mentality, as well as of the substantial forces of Nature through which He ordained the universe and by which He now orders all things.

No reader, therefore, will fail to see the bearing and value of this persistent discussion of the sound-question in THE MICROCOSM, nor should he grudge the room it takes, even if he may not himself appreciate that kind of argument, especially in view of the great number and diversity of other discussions from the pens of so many excellent contributors, adapted to all classes of readers.

A BLOW AT SUBSTANTIALISM.

Editor Journal:

For some time Wilford Hall and others have been fighting with desperation the Wave Theory of Sound. The theory given instead is the revived Corpuscular Theory advanced by Newton, but abandoned by him as untenable.

Now it is not my intention to go into a lengthy discussion in this article as to the relative merits or demerits of the two theories. This has been done divers times by abler pens than mine. Rather is it my wish to bring to the notice of your readers a peculiar and remarkable phenomenon, with an

explanation of the same, and ask any follower of Hall to explain the phenomenon on the Corpuscular Theory

These are the facts referred to:

General Duane has observed that in the use of the fog-whistle on the coast of Maine, "the signal often appears to be surrounded by a belt, varying in radius from one to one and a half miles, from which the sound appears to be entirely absent, thus, in moving directly from a station the sound is audible for the distance of a mile, is then lost for about the same distance, after which it is again distinctly heard for a long time."

Here is the explanation offered by Dr. Tyndall: "For a long time past I have thought that this disappearance of the sound was due to the interference with the direct waves, of waves reflected from the surface of the sea.

"This explanation is capable of very accurate experimental illustration. Placing, for instance, a sensitive flame at a distance of three or four feet from a sounding reed, the flame exhibits the usual agitation. Lifting a light plank between the flame and reed, a position is easily attained where the sound, reflected from the flame, increases the flame's agitation.

"Lifting the plank carefully still higher, a level is attained reflection from which completely stills the flame. By slightly raising or lowering the plank, or by its entire removal, the flame is once more agitated. In these experiments a high-pitched reed was used, so that it was easy to produce, by the motion of the plank, the retardation of half a wave length requisite for interference."

To my mind this is a very plausible and satisfactory explanation. Will some one be kind enough to show the fallacy of the above, and give a better explanation based on the Corpuscular Theory?

Pardon so heavy a draft on your patience and space. Very truly yours, JAS. H. CLARK.

STANBERRY NORMAL, Feb. 5, '83.

—o—

REPLY TO THE FOREGOING.

The above communication appears in the North West Mo. *School Journal*, whose editor, Prof. C. H. Morris, A.M., Principal of the Stanberry Normal School, has become fully convinced of the truth of our corpuscular theory of sound, and that the wave-theory has totally broken down under the arguments contained in the *Problem of Human Life*. We state this much by way of prefatory remarks.

Now, the writer of the foregoing is wholly and almost inexcusably mistaken about our position on sound being "the revived corpuscular theory *advanced by Newton, but abandoned by him as untenable*." Mr. Clark refers, of course, to the corpuscular or *emission theory of light* which Newton held for a long time, but which he finally abandoned for the undulatory theory, which he thought was necessary in order to make *light* and *sound* harmonize, as every consistent scientific thinker must see ought to be the case. As neither Newton nor anyone else had ever entertained a doubt about the correctness of the wave-theory of *sound*, no wonder Newton finally saw the incongruity of holding that *light* consisted of substantial emissions, while *sound* confessedly could consist of nothing but air-waves, or a mode of atmospheric motion. Hence he gave up the corpuscular theory of light, since it never entered his mind that the wave-theory of *sound* could be otherwise than true. Had Newton caught even a glimpse of our view of sound, as elaborated in the *Problem of Human Life*, he would never have been driven from the emission theory of light, but would have strengthened and defended that view by the very analogy that must exist between the two sensations of sight and hearing.

No, Mr. Clark, you must take it all back and apologize. Nobody ever intimated the *corpuscular* or *substantial* theory of *sound* till it was first printed in the *Problem*, and no one ever thought of denying the vibration of the *tympanic membrane* by the dashing of air-waves against it as the true mode or method of hearing sound till the absurd notion was exploded in the same book. Now, however, there are no less than a dozen high anatomical and physiological authorities writing in different scientific journals against the same notion, helping us to expose the gross impossibility of tympanic vibration. Two of these we quote elsewhere to show how triumphantly our original position on this subject is being sustained by volunteer help and by invincible arguments. These extracts sink Tyndall's air-waves and Helmholtz's analysis of the ear out of sight, and must make those greatest living physicists secretly regret that they ever wrote their books on sound.

As to the explanation of the "soundless zones" witnessed by Gen. Duane, the *substantial theory of sound* is the only possible view that gives any kind of solution, as seen in our article on that subject elsewhere. To see the evident incorrectness of Prof. Tyndall's explanation of the difficulty by reflected waves from the surface of the water interfering with the direct waves from the fog-horn, we have only to reflect that such interference, according to the theory, takes place by the air-waves of one sound being a half-wave-length behind or ahead of those of the other, so that the "condensations" from the reflected waves would just fall into the "rarefactions" of the direct waves. Now if the fog-horn were sounding the middle A of the piano, its wave-lengths would be almost exactly thirty inches; hence the people on shipboard would only have to sway their heads fifteen inches back and forth to throw their ears alternately into either a reflected *condensation* or *rarefaction*, and consequently into sound or silence! It is positively puerile for scientists to continue to talk about the possible interference of sound by changing the two unison sounding instruments from a whole to a half-wave-length apart, when the most crucial tests with unison instruments of all kinds and at all possible distances apart produce no sort of variation or diminution in the intensity of their united sounds. Tyndall and Mayer both

know this to be a fact, and have known it ever since we sent them the *Problem of Human Life;* and any attempt on their part still to bolster up the shallow idea of sound-interference, as their books plainly teach, will only sink them lower in the scale either of intelligence or honesty as viewed by every thoughtful student of science capable of grasping such questions. As we have said in the *Problem*, so self-evidently false is this essential doctrine of "half a wave-length requisite for interference," on which the whole wave-theory is based, that two little boys with unison penny-whistles could drive both Tyndall and Mayer from the platform, and make them hide their faces for having so outrageously imposed upon the intelligence of the world. Prof. Tyndall, it would seem, ashamed to come out and confess the theory all bosh, is even yet seeking to befog his "soundless zones" with a pretended law which he dare not try to vindicate in an open field with unison instruments of his own choosing, whose so-called wave-lengths and half-wave-lengths can be known, measured, and tested. We challenge him again to the trial, and he can choose his own unison instruments, his own ground, his own judges, and make his own report of the experiment. But he must be very careful not to repeat his "tin-tube" business, as there are thousands of converts to *Substantialism* who are watching anxiously every word he dares to write on sound. Let him remember that the wave-theory is about breathing its last, and that any professor who cares for his future reputation should stand from under.

The statement of Prof. Tyndall about the "sensitive flame" and the "plank," has just about as much to do with half-wave-length interference as had his celebrated "*double-siren*" experiment, *in which he entirely mistook the leap of the tone from the fundamental to the octave, for "silence"!* (See *Problem*, page 286, and onward.) After having such a superficial blunder pointed out to him, to the amusement of thousands of scientific students, he would do well to be a little cautious in his confident talk about this movable "plank" and the "*half-wave-length requisite for interference.*"

PROF. FRENCH IN THE NEW-CHURCH REVIEW.—No. 2.

We now proceed with our answer to the criticisms of Prof. French in the January number of the *New-Church Review*, in which he not only signally fails to weaken our assaults upon the wave-theory of sound, but in which he absolutely breaks down the theory, burying himself in its ruins, as was so fully proved last month in analyzing the motion of a tuning-fork's prongs.

2. The second criticism attempted by this reviewer is directed against our exposition of *magazine explosions*, in which we show in the *Problem of Human Life* that the wave-theory voluntarily and necessarily teaches that the compressed air-wave, sent off from an explosion of powder, and which breaks windows at a distance, is *identical with the sound-pulse itself.* In that exposition in the "Problem" we show further that the most critical writers on acoustics, including Tyndall, Helmholtz, and Mayer, entirely overlook the fact that such compressed air-wave is wholly distinct from the *sound* or *noise* of the explosion which accompanies the concussion shock. We also call attention to a fact not to be found, even intimated, in any other work on acoustics, namely, that at such explosion thousands of cubic yards of powder-gas, being instantaneously generated and added to the air, such gas necessarily drives away a densely compressed atmospheric wave which is the real cause of all the damage both near to and distant from the exploding magazine; and that the *sound*, so far from breaking a pane of glass two or three miles away would not, *per se*, stir a feather (not actually tensioned in unison with the tone) even within a few feet of the exploding magazine.

Readers of the "*Problem*" well remember that we quoted (page 105) from Prof. Tyndall's description of a destructive explosion which took place a few miles from the village of Erith, in which he distinctly tells us that the *sound* of the explosion shattered the windows of the village-houses, and bent in the lead sash of the village-church! And in the *New-Church Review* Prof. French, with our exposition directly before his eyes, positively still indorses the current view, agreeing with Prof. Tyndall that the condensed wave, which broke the windows at Erith, *was identical with the sound-pulse itself!* It does not seem possible, however, that Prof. French could have read our exposure of this childish fallacy and still cling, as he does, to the ridiculous notion that *sound* or *noise* was the cause of those destructive effects. But students of science are positively forced to this conclusion as they read his pretentious review of our book.

The truth is, so impossible does it seem that any scientific thinker could believe such nonsense as that admission involves, that we have always looked with surprise upon this error as the weakest thing to be found in Prof. Tyndall's writings, with the exception, perhaps, of the famous tin-tube experiment in which he claims to "*blow* out a candle" by a sound-pulse without a "*puff* of air," and possibly also excepting the "*swiftly* advancing" prongs of a tuning-fork carving the air at the enormous velocity, as we showed last month, of less than *one inch in a second* at the swiftest part of its motion! We fail to conjecture how an average plowman could be so resourceless as not to see, when looking at those shattered windows in the village, that if such breakage were the effect of the

sound, then the total destruction of buildings, and the disintegration of men and horses which took place nearer to the magazine, must also have been the result of this same *noise!* Yet it is a lamentable fact that followers of Prof. Tyndall, such as our critic at Urbana University, have not the mental grasp, even after their attention has been called to it, to reason that far back from the village toward the source of the explosion, and thus see the prodigious absurdity to which their theory necessarily leads. If they possessed even school-boy sagacity they would laugh outright when they would come to reflect upon the stupidity which could neglect such a logical comprehension of the premises. Is it not incomprehensible, for example, that such a world-renowned physicist as Prof. Tyndall, with these facts right before him while visiting the village of Erith should not have surmised that there was some mistake about this idea of *sound* breaking the windows when it necessarily involved as it did the tearing of men and horses to pieces by the very same *noise* or *sound* nearer to the magazine? Plainly a brick-layer ought to have reasoned that far, and suspected that whatever shattered the window-glass two or three miles away was the very same cause which shattered the buildings themselves, leaving not one brick upon another in the neighborhood of the magazine. Had a school-girl, the next morning after the explosion, passed by the magazine in going to the village, and noticed the frightful effects of the compressed wave near to where the explosion occurred; and had she then observed as she passed on that its effects were less and less violent as she neared the village till finally nothing but broken glass could be seen as its effect around the village-houses, what could have been her conclusion? Why, her intuition would have told her that the same cause which did a part produced the entire effect, and if it was *sound* which crushed the glass at the village, then it must have been *sound* and nothing else which caused the greater destruction near the magazine. Yet the greatest English-speaking scientist did not see it. Neither does the most diminutive one we know of, after it has been explained to him.

It is simply marvelous that men whose very lives and professions are devoted to such physical investigations as these could not have seen from the process of reasoning here suggested that the entire effect was produced by the self same cause,—the enormous quantity of gas instantaneously added to the air, thus causing the *more* destructive effect where the atmospheric compression was necessarily greatest, and the *less* destructive effect as the wave expanded and took in a wider scope of air. The most witless man, it would seem, who pretends to think on scientific matters at all, ought to have seen that the effect of the compressed wave would naturally be most violent directly where the gas was generated and added to the air, and that this condensation would grow weaker and weaker, and produce less and less concussive effect as it expanded and took in a wider range of atmosphere till, on reaching the village two or three miles away, its effects would be so reduced that it would only break the windows of the buildings. But the erroneous description, as given in the text-books, only shows the tyrannizing power of a life-long belief in a theory of science in blinding the intellects of the greatest of men till they will overlook facts and conclusions that an untrammeled child would catch at a glance. Had Prof. Tyndall been asked, when not upon his favorite discussion of the wave-theory, if he believed that a *sound* could be *loud* enough to kill a horse and tear him to pieces, he would have laughed at such a preposterous supposition; yet the wave-theory, as we have seen, led him into teaching that very absurdity as a sober scientific truth.

Viewing the compressed air-wave sent off from an explosion, and its manifest cause by the sudden addition of gas, as here described, no wonder that we should be led to make the prediction we did as recorded in the *Problem of Human Life*, and which must strike every thoughtful student of science as self-evidently probable the moment his attention is called to it. What was that prediction which Prof. French now passes over with a sneer? We simply stated our belief, from all the facts of the case that, as the force of the condensed air-wave would necessarily grow weaker the farther the condensation traveled, its *velocity* of travel would also decrease in a corresponding ratio, until at a sufficient distance away from the magazine it would be found, by proper instruments, not to travel one half as fast as at the start. In this way we proposed to prove to candid scientific investigators that the sound-pulse, produced by the explosion, was an entirely different effect from the air-wave which broke the windows; because it is well known from observation that a sound travels with one uniform velocity throughout its entire range of audibility. Hence our prediction (in accordance with our claimed discovery that the wave-theory was erroneous) that while the sound would be found to travel at one uniform velocity throughout its entire range, the air-wave would be found to travel with a variable velocity, probably outshipping the sound-pulse at the start (especially if a large quantity of powder were exploded), and that the sound would then soon overtake and pass it, and finally that at a sufficiently distant station the atmospheric wave would be found lagging far behind the sound, thus demonstrating their *non-identity*, though they might have been found exactly together at the distance Erith was from the explosion. The wave-theory absolutely stands or

falls on the truth or falsity of this prediction. Real scientists are beginning to see it, but a few shell-bound impenetrables like Prof. French, too utterly befogged by the wave-theory to think one clean scentific thought upon the subject, as we will soon see, fail to grasp the point of our prediction or even to comprehend the intrinsic difference between *air*, *gas* and *noise*.

The truth is, it would be just as rational to suppose that it was the tremendous *flash of light* produced by the explosion which broke the windows at Erith, as that it was the *flash of sound*, were it not from the mere accident that light travels so much swifter than the compressed air-wave. But for this fortuitous fact we might be sure that Prof. Tyndall would have blunderingly told us that it was the tremendous wave of "*luminiferous ether*," "a substance more resembling a *jelly* than a *gas*," which broke the windows and bent in the lead sash of the church! But as the flash of light evidently reached the village some ten or twelve seconds before the windows gave way, this fact alone enabled the "highest living authority" to infer that it could not have been the effect of his *gelatinous ether* which crushed the glass! But he failed to draw the same sensible conclusion with regard to the *sound* because, unfortunately for science, the sonorous pulse and the atmospheric pulse arrived so nearly at the same time that ordinary observation did not detect the difference between them, though in reality the *sound-pulse* had no more to do with breaking the windows than had the *light-pulse* that preceded it!

Let us now state a couple of facts for the edification of our New-Church critic. The first fact may be included in our prediction, and is as follows: If the same quantity of powder that broke the windows at Erith were to be spread out loosely over the ground and ignited, it would produce the same destructive effect in shattering buildings near by, and in breaking windows at a distance; because the same quantity of gas would be added to the air, while its sound or report would scarcely be audible a mile away, since such an unconfined explosion would produce comparatively a mere puff! We predict that a test of this kind will demonstrate what is thus plain without a test to the reason of every man who will take the trouble to think.

The second fact is, that a thunder-clap, which is the loudest sound that ever addressed the human ear, particularly where the hearer happens to be in a house when struck by lightning, *will not mar a pane of glass in the very building struck, nor stir a feather a single foot from the path of the bolt!* Why? Simply because such a sound is *nothing but sound*, not being accompanied by an addition of gas, and consequently it does not send off a compressed air-wave or stir anything not in unison with its tone. Is not this a plain, common-sense view of the matter? Yet Prof. Tyndall and our critic could not compass so elementary a distinction.

We cannot of course, blame Prof. Tyndall so much for this prodigious oversight about the shattering of the windows at Erith and its self-manifest cause, since he wrote his book under the inspiration of the wave-theory and under the influence of the accumulation of generations of scientific opinions and teachings on the subject, and before any one had called in question the theory which taught so grave an error. Hence he had nothing but the fallacious theory of air-waves to guide him. But not so with Prof. French. He swallows this monstrous fallacy with his eyes open and with the impossibility of its truth definitely pointed out and the reasons for it explained to him. With all this light flashed upon the problem to aid his mental tenebrosity, he still prefers to grope in the dark and go on teaching his classes the superlative nonsense that a *sound* or mere *noise* will tear men and horses to pieces, level buildings to the dust, and scatter their fragments over acres of ground, while he knows that *another sound still louder*, caused by a stroke of lightning, will not mar the most fragile thing in a building within a foot of the place where the thunderbolt strikes! And this is the scientist put forward to crush out the *Problem of Human Life* in the *New-Church Review!*

But enough of this. To show that our unanswerable analysis of the facts produced no effect upon the mind of this critic, we will now treat our readers to every word, verbatim, of his reply to that terrible arraignment of the current theory of acoustics. Here it is taken bodily from the *New Church Review:*

"Another 'sonorous problem,' adduced by Mr. Hall and by him considered *second in importance* to no other question connected with the discussion, is that of magazine explosions. Mr. Hall's discussion of this topic may be aptly compared to the discharge of a pistol that is loaded with nothing but powder; *considerable empty noise is made, but it is perfectly harmless to everybody and everything*, including the wave-theory of sound. So far as the gas generated in a powder explosion is concerned, there will be no question. If the chemistry of instantaneous combustion has not been mentioned by physicists in this connection, it is not from ignorance of the facts but because they deemed it unnecessary to mention what seems included in the very meaning of the word, 'explosion.'

As to the second point urged by Mr. Hall, namely, the *non-identity of the condensed air-pulse, produced by an explosion, with the sound-pulse produced by the same cause*, I presume any physicist would say: 'Make thy vaunting true and it shall please me well.' [*He thus agrees with Tyndall*].

A prediction is made, and physicists are asked to spend their time and money in testing it, regardless of the fact that they have more profitable employment for both time and means. Physicists do not doubt that the concussive air-pulse—*being the ob-*

jective cause of the sound—reaches the ear simultaneously with the sound; why should they seek to prove that of which they entertain no doubt? If Mr. Hall claims to be an *investigator, the proper and scientific way* would be for him to carefully test his own theories, with competent assistance, *before publishing them, and not scatter them broadcast*, and expect others, who consider them groundless, to test them for him. He proves absolutely nothing in the premises; he simply makes bold assertions unsupported by evidence."

Here, reader, is the entire reply to our argument upon *magazine explosions*, one of the three criticisms by Prof. French which the Rev. Mr. Mann, editor of the *New Jerusalem Messenger*, really thinks ground the "*Problem*" to "powder." Poor *Mann!* He needs sympathy.

Aside: Is it not strange that Prof. French can see that the "empty noise" of our argument is "*perfectly harmless* to everybody and everything," because it is "empty noise," and yet that he can believe that the "empty noise" at Erith broke windows, killed men and horses, and leveled buildings and forest trees to the ground?

We frankly confess to the charge of having made a scientific prediction and to having asked physicists, who had better facilities for experimenting than we, to aid us to prove the truth of our positions and thus help us wipe from the text-books of our schools an erroneous theory of science. Why should we be condemned for this request? Prof. French forgets the memorable example of Leverrier who by scientific calculation had determined, as he believed, the existence of a large planet at a certain part of the heavens, but so distant that his own small telescope would not enable him to detect it. He thought it proper and right in an "investigator" to announce his theory, and ask other scientists, who had better facilities, to aid him in verifying his scientific prediction; and to the honor of science, be it said, this assistance was not refused on the score of jealous envy lest the real discoverer should get credit for a praiseworthy achievement. Dr Galle, of the Berlin Observatory, pointed his large telescope to the part of the heavens indicated by Leverrier and the result was the optical discovery of Neptune, a grand addition to our knowledge of the solar system. Had the shrivelled-souled scientist of Urbana University been in charge of the Berlin Observatory, he would no doubt have issued a pronunciamento condemning Leverrier for not finding the planet himself.

The exhaustive analysis of this question has extended so much beyond what we had intended when we commenced writing, that we will be obliged to defer the "locust argument" (a most important discussion by the way, and one upon which Prof. French is hopelessly befogged), to be analyzed next month, when the Professor will be finally disposed of.

PROF. COMSTOCK—ANOTHER RECRUIT FOR NEWTON.

The Galesburg (Ill.) *Republican-Register* prints two long articles from the pen of Prof. Comstock, of Knox College, at that place, in which he attempts a series of criticisms upon the gravitation arguments of THE MICROCOSM, and a more sorry effort at scientific argumentation upon those questions we confess never to have read—not even from Prof. Gray himself. This critic takes the same position exactly that Prof. Gray took, as shown in last month's MICROCOSM, namely: that the moon does not, by *reaction*, pull or shove itself toward the earth at all, though it pulls at the earth with one-eightieth as much force as the earth pulls at it. He claims that the moon, if let drop, would be pulled by the earth a certain distance in a second, while at the same time the moon would pull the earth a small fraction of that distance, each of course moving alone by the direct attraction of the other. But he denies, in toto, any *reactive effect* on either the earth or the moon in its pulling the other. That is to say, he emphatically denies that the moon in pulling at the earth pulls or shoves itself toward the earth in the slightest degree; and the same precisely of the earth pulling at the moon. This is flying directly into the face of every work on natural philosophy published, since all agree that action and reaction are equal. This shallow view gives us Prof. Gray right over again; but Prof. Comstock, unlike Prof Gray, neglects to give the reason for it, namely: that the moon and the earth each have rays of gravity extending out in the opposite direction which *pull at nothing*, and thus counter-balance their pull at each other! Prof. Comstock was doubtless afraid to give the real reason for his position, while Prof. Gray, more courageous, or less cautious, came out with it frankly.

Now, how does all this anti-reaction philosophy look by the side of Captain Carter's positive demonstration in last month's MICROCOSM, in which Newton's great underlying principle of gravity is shown unavoidably to teach that *one-half* of the moon's fall is due to the reaction of its own pull at the earth, while *the other half only* is due to the earth's direct attraction of the moon? That central principle of gravity as quoted at the head of Captain Carter's article is also actually quoted by Prof. Comstock, but plainly without the slightest comprehension of its bearing. Look at the flat contradiction between Prof. Comstock's view and the unanswerable demonstration of Captain Carter, based as it is upon Newton's fundamental principle. Prof. Comstock says.

"The *direct attraction* of the moon upon the earth overcomes the inertia of the earth, *and under the impulse the earth moves toward the moon;* it moves toward the moon because it is at-

tracted in that direction by the moon; *and the moon does not move toward the earth under the action of this force, because there is no part of the moon's attraction for the earth which acts toward the earth.* * * * Mr. Hall's error consists in strangely confounding the motion of the earth, which is due to the attraction of the moon, with an imaginary motion of the moon toward the earth, through which '*the moon pulls itself toward the earth.*' *But there is no such action of the moon,* as has been abundantly shown, and hence his whole scheme of assertions is without foundation."

This total denial of reaction on the part of the moon is another pretty muddle for Newton's great law. And so the mathematicians have it hip and thigh! Prof. Comstock not only contradicts Newton's central principle of gravity which teaches that *one-half* of the moon's fall must be due to reaction or to its own pull at the earth, as Captain Carter so clearly shows, whether Newton saw it or not, but he contradicts Professors Goodenow and Kemper, who both admit that the moon falls, more or less, by reaction, or in consequence of its own pull at the earth. He also contradicts well-known facts and common sense by thus denying reactive effect in the pull of two attracting bodies, as anyone can prove by floating a steel magnet on a chip in a bowl of water and then holding at one side of the bowl a piece of soft iron, which has no reciprocal attraction for the magnet, and, of course, does not pull it by direct action at all. Such experiment will demonstrate the fallacy of Prof. Comstock's entire statement by showing that the magnet will instantly commence *pulling itself by reaction toward the soft iron,* and would also, of course, pull the iron (if free to move) toward the magnet. Yet this pretentious mathematical reviewer, who calls the editor of THE MICROCOSM an "ignoramus" for supposing any portion of the moon's fall to be due to its own reactive pull at the earth, could be tied hand and foot, and scientifically pulverized by any school-boy having a common horseshoe magnet and a piece of soft iron. Strange, indeed, that the great professors of our colleges cannot comprehend what a child ought to see at a glance, and be able to demonstrate in two minutes! If Prof. Comstock has not the advantages of a steel magnet, such as referred to, among the apparatus of Knox College, and will let us know, we will donate one to that institution, and send it by mail, free of charge.

But we have said enough to show that it is not worth the room it takes in THE MICROCOSM, to consume any more time with such imbecile conceptions of reactive attraction, though we do this much to help immortalize the distinguished professor. As his entire two articles are based upon this laughable assumption that no reaction occurs in a body attracted toward the earth to help produce its fall, thus contradicting Newton as well as every professor who has written on the subject except Prof. Gray; and as this view has just been overturned and shattered by the well-known action of the magnet, the *Republican-Register* cannot do a better thing for its readers than to give them light upon the subject by printing these strictures upon the Professor's six mortal columns of mathematical bosh, which we are pleased to learn from the Editor he will cheerfully do.

Professor Comstock closes his last article with the following:—

"This same Hall has made an attack upon the accepted theory of sound, with scarcely more wisdom or better success than has attended his attempt 'to shatter the law of gravitation;' and I hope, at some time not far distant, to be able to expose a few of his fallacies in that department also, and thus to do something for the benefit of those who are searching after truth.'

"Those who are searching after truth," will be apt to find it when this professor succeeds, as he certainly will, in breaking down the wave-theory by attempting to defend it. If he gets no nearer the "truth" in his attempt on sound than he has come to it in his abortive effort on gravity, there will be little need of our noticing it in THE MICROCOSM. As he is a subscriber for this journal, and we trust a reader, it would be well for him to take warning from what he sees in its monthly columns and thus learn to keep out of harm's way by steering clear of THE MICROCOSM. But if he will persist in putting his scientific foot in it, he must be prepared to take what comes.

SPECIMEN NOTICE OF OUR JOURNAL.

Wish we could copy a hundred of the kind notices of THE MICROCOSM continually appearing in the press of the country; but we have not the room. Here is a specimen:

[*From "Southern (Ky.) Republican," Somerset.*]

"We commend WILFORD'S MICROCOSM to the attention of all thinking men. It occupies advanced ground on all religio-scientific topics that are embraced in its discussions, and furnishes abundant food-thought for the religionist and the scientist. The ablest theologians of the country are among its contributors, and every line that the journal contains from month to month is worthy of critical examination. It is pre-eminently the publication for ministers, and they can learn much of the occult things connected with their profession when viewed through its interpreting pages. Published by Hall & Co., 23 Park Row, N. Y."

OUR EXCHANGES

Are at perfect liberty to copy any articles from this journal by giving due credit to THE MICROCOSM. We regret to state that a few cases have come under our notice where this manifestly just act of journalistic courtesy was no doubt inadvertently overlooked.

TYNDALL, HUXLEY, AND SPENCER.

BY PROF. HENRY S. SCHELL, A.M.

Editor of THE MICROCOSM:

I find the following in a city paper, telegraphed from London to the Associated Press:

BLASPHEMERS IN ENGLISH LITERATURE.

LONDON, March 5.—The Society for the Suppression of Blasphemous Literature propose to get up cases against Profs. Huxley, and Tyndall, Herbert Spencer, the publishers of John Stuart Mill's works, Mr. John Morley, and others, who "by their writings have sown widespread unbelief and in some cases rank atheism."

It is undoubtedly true that the writings of these men have "sown widespread unbelief and in some cases rank atheism," but I seriously question the expediency of the course proposed to be pursued by this well-meaning society. It will, in my opinion, not only fail to suppress atheism, evolution, or materialism, but by thus instituting legal prosecution will embitter and harden those inclined to be skeptical, and make five atheists where it will intimidate one. Religious belief or philosophical opinion can never be suppressed by the restraints of law or persecution by any society. All history proves this;—the blood of the *saints* was always the seed of Christ's church, and even the blood of those *sinners* would be the seed of the devil's church.

The masses of the most earnest evolutionists and consequent atheists of Great Britain are not made such as the result of their own careful and intelligent investigations, but by the influence of a few great names in science, such as those of Tyndall, Darwin, Huxley, Spencer, and some others, whose popularity as scientific investigators forms the creed of this blind following, who, of course, know nothing about how to meet evolution and materialistic arguments. Could means be taken to educate the more intelligent and candid of these masses, who now throw up their hats for Tyndall or Spencer, by putting into their hands such documents as would silence their chiefs and show their utter unreliability, those followers would soon get their eyes open and evince their English pluck by getting up a war in the evolution camp. Let the rank and file be convinced that their chiefs are not only fallible men, but mere superficial and self-contradictory shams in science, and soon the hitherto invincible leaders would feel the very ground tremble beneath their feet. A thousand active opponents would spring up against evolution as soon as unanswerable arguments against the theory could be placed in their hands.

If this London society would elect to expend half as much money in buying two or three thousand copies of the *Problem of Human Life* and loan or distribute them gratuitously, as it would cost to prosecute Tyndall, Huxley, Spencer & Co., and get beaten, they would put weapons into the hands of an army of thinkers which would make those famous scientists stop their blasphemy and seek obscurity in less than six months. No living man can answer the arguments of that book against evolution and materialism, while the total upset of Prof. Tyndall on the sound-theory, and the merciless exposure of his shallowness in the simplest matters of physical science, would crush the dogma of so-called scientific infallibility and do more against atheism and infidelity in one year than all the prosecution and persecution by religious societies will ever accomplish with millions of money to back them. Why cannot an anti-evolution society be started here, where it is needed almost as badly as it is in England, to hurl the *Problem* and MICROCOSM as red-hot shot into the clerical army of theistic evolutionists which has been so rapidly on the increase of late years? Many lovers of the *Problem* and of the Bible would join such a society, and assist in wiping out the whole monkey-begotten tribe. Please, Mr. Editor, send this suggestion out to your tens of thousands of readers, and learn their views in regard to it.

NEW YORK, March 26, 1883. H. S. S.

"JESUS FOR THE WORLD."

Our friend, Rev. Dr. Olmsted, author of the *Walks and Words of Jesus*, has just placed on our desk a copy of a new 24-page double-column magazine with the above title, of which he is the editor, and designed for the use of Sunday-Schools and the family circle. We have examined the first number of this neat and very pretty monthly, and are pleased with its great variety of topics, original and selected, making it interesting and instructive to both young and old. No Sunday-School teacher or superintendent should fail to send for a copy of this new journal, and examine it, with a view to its introduction into families and among Sunday-School scholars. Its tendency can only be elevating and purifying to the minds of all classes, young and old, who read it.

Dr. Olmsted intends to devote his whole time for the future to this work, and no teacher or pastor can do a better thing for the moral culture of a community than to aid in its circulation.

Price $1. per year, beginning with the volume. Single numbers, 10 cents. Address Rev. M. N. Olmsted, Editor, Mt. Vernon, New York.

We cannot consistently close this notice without thanking the Doctor for his very flattering sketch of the Editor of THE MICROCOSM in this first number of his new magazine. We feel grateful as well as gratified that he can feel free to say such kindly things of the work we are doing.

A KIND WORD FROM MO.

"* * * * I had thought of writing a short article for THE MICROCOSM; but when I turn over and examine the pages of this religio-scientific gem of modern literature, and contemplate the elegant diction of a Swander, the resistless reasoning of a Roberts, the profound logic of a Kephart, the pointed and telling hits of a Carter, and the brilliant and original arguments of other shining lights among your contributors, to say nothing of the editor's invincible scientific criticisms, I am content to give the space I might occupy to better talent." Yours very truly,

ELSTON, Mo. J. A. ELSTON.
March 20th 1883.

"THE TIMES OF THIS IGNORANCE," &c. Acts XVII:30.

We have received an exposition of the above text, scriptural, philosophical, and historical, from the pen of Prof. J. R. Hand, of Richmond, Mo., which we unhesitatingly pronounce the finest thing upon the subject we have ever seen. This paper will appear in the next number of THE MICROCOSM, and clergymen especially may anticipate a treat, as there are very few ministers of the gospel who have not some time or other preached from that text.

THE WORK GOES BRAVELY ON.

We have a copy of *The Gleaner*, for February, before us. It is the College paper of Hedding College, at Abingdon, Ill. One of the assistant Editors, Samuel T. Mosser, has delivered two lectures before the college faculty and students on the Sound controversy, taking strong ground in favor of *Substantialism* and against the wave-theory, which lectures have been published in *The Gleaner*. The first lecture was entitled—"The fallacy of the wave-theory," and the second—"The corpuscular theory of Sound," is printed in the number of *The Gleaner* before us. The lecturer has hopelessly apostatized from the faith Tyndall once delivered to the scientific saints. He is one of the most outspoken advocates of the substantial nature of Sound and one of the most courageous opposers of the wave-theory we have yet read, while he does not hesitate to give full credit for every argument he uses to the *Problem of Human Life*. As a specimen of his style of presenting the argument we give below the closing paragraph of his last lecture:

"We have now shown you how utterly impossible it is to explain sound-phenomena by the preposterous "Wave-Theory," and how beautifully everything accords with the "Corpuscular Theory." Now I appeal to you in the name of science and reason, can you follow such a hypothesis as the wave-theory? It matters not if it is taught as science. That does not make it so. Examine it! and see how superficial it is. Question it! You can puzzle anyone who pretends to teach it, and you will at last triumph. The day of a new scientific era is dawning; yonder is its Sun just coming above the horizon. Behold! how beautiful, how glorious, as it sends to us its golden rays of truth, and on it is written in letters of living light the word "Substantialism," that which is to save this wicked world; that which proves the "immortality of the soul;" that which teaches there is "hope beyond;" teaches that "it is not all of life to live, nor all of death to die." With it religion is beautifully proven by science. With it there would be fewer Ingersolls to stand out boldly against religion. Science would no longer conflict with truth, but all would universally acknowledge God as Jehovah, and "praise His holy name."

THE "RELIGIOUS TELESCOPE."

It is surprising to what depths of unchristian littleness the jealousy of certain critics often sinks them. This is illustrated by a recent disparaging notice of THE MICROCOSM in the *Religious* (?) *Telescope*. The editor manifestly can have nothing against us or our magazine except what may arise from a feeling of envy at the enthusiasm manifested for THE MICROCOSM by hundreds of his own subscribers, and by all classes of high-minded Christian readers. We regret to think this, but plainly nothing less than such an unenviable motive could have prompted the notice referred to in view of the fact that the same grand aim is the goal for which both our journals are working. No really sincere religious paper could possibly speak otherwise than kindly of our efforts to break down materialistic infidelity, and we must think that the *Telescope* would have so written had it been half as "religious" as its *nom de plume* implies. Or possibly it may be a still meaner motive than jealousy that inspired this telescopic notice, namely, a dislike for one of our leading contributors whom that "Religious" journal did not dare to slap personally. If so could spleen sink its possessor to a lower depth?

CAPT. CARTER'S HIT AT TYNDALL.

We print elsewhere one of the neatest and most scientific hits at Prof. Tyndall, from the pen of Capt. Carter, that we have yet seen. It does really seem that Prof. Tyndall is on the decline intellectually, or at least *acoustically*. He has scarcely written or spoken a word on the wave-theory for more than three years, or since the "*Problem*" was first put into his hands. We predicted then that his days of lecturing and writing on the current theory of sound were about over, and that we should probably never hear his winning voice again nor see his lucid and pleasing explanations of acoustical science in which he was such a master. For a wonder, however, he has ventured to try his hand once more, so far at least as barely to allude to the theory while talking on light; but in doing so he has hopelesly involved himself worse than before, and, as Capt. Carter shows, given up everything, even to the last faint hope of materialism. We now with open arms welcome the eminent professor to the ranks of *Substantialism* with his reinforcement of immaterial "*ether*" as a "*substantial entity*" circulating throughout all bodies. As this immaterial "substance" is thus, as he confesses, capable of *thrilling* material bodies, he has but one short and honest step to take and he is with us. Thanks to Capt. Carter

AN EXTRAORDINARY OFFER.

Any person who will send us the names of *two new subscribers* for the present volume of THE MICROCOSM *from the commencement*, with the money ($2), will receive credit for the next volume as a premium. Persons sending names under this offer should intimate it, that due credits may be given. A few minutes' effort, by almost any subscriber, among his friends, could accomplish this result; and, of course, the sooner the effort is made the easier the names can be secured. A pastor, especially, who wishes THE MICROCOSM to be read by his people, could, with a few words, induce a couple of the thinking members of his congregation to take it. Who will start out, on reading this offer, and thus secure the next volume free while aiding the spread of useful reading matter? Remit money in post-office orders or bank drafts on New York, when convenient, as an absolutely safe way. If this is not convenient, send in registered letters. Address, Hall & Co., Publishers, 23 Park Row, New York.

☞SEVERAL Editorials and other papers of importance have been crowded over to next number, among which is our reply to Judge Poston. In fact the Judge's argument is so amiable we were perfectly willing to give it a month the start.

WILFORD'S MICROCOSM.

Vol. II.—No. 10. NEW YORK, MAY, 1883. { One Dollar a Year. Single Copy 10 cts.

THE BIBLE AND SCIENCE NOT ANTAGONISTIC.

BY REV. J. J. SMITH, D. D.

If God be the author of both Nature and Revelation, as we firmly believe He is, it inevitably follows that there can be no real conflict between the teachings, and the legitimate deductions of the two. And, yet, it would be perfectly absurd to regard them as of equal authority in these two distinct realms of thought. Revelation has to do principally with the immaterial, the spiritual, with moral questions, with man's origin, nature, religious necessities, duties, possibilities and destiny. And all these it is well known lie beyond the confines of even the outer fields of science. Hence, on these vast and vital subjects, mere science is as silent as the grave; and is without the least authority; for these themes are too lofty for her grasp. Revelation alone can penetrate the unseen, and unfold these vast and mighty wonders. Hence upon all these subjects the Bible is primary, and Science secondary. So, on the other hand, in the investigation and determination of physical phenomena, Science is primary and Revelation secondary. And, yet, we freely admit, that although the Bible was not written in the interest of Science, and consequently is not a Scientific book, and therefore should not be judged by modern rigid scientific tests; there should be no antagonism or conflict between them. In fact, we affirm that although it was not the design of God to give in the few opening lines of Genesis an exact scientific statement of the stages and order of creation; yet, that, in all instances where they chance to take cognizance of the same facts there is unmistakable harmony between them.

It is in view of the necessity of such harmony, in the supposition that God is the author of both, that has led certain writers who discard the Bible as a revelation from heaven, to seek to find some unmistakable instance of manifest antagonism. But, so far, not only have all attempts of this kind proven abortive, but they have served in many instances greatly to strengthen the claim of Moses to divine inspiration, while they have uniformly failed in all cases to lessen the credibility of such claim. My purpose in the present article is not to present a general view of this subject, nor even so much as to give a synopsis of the numerous points of agreement between the two, but simply to call attention to two cases, one of which presents an important instance of remarkable harmony between the Mosaic account, and the deduction of geology: and the other, as is claimed by skeptics, a case of antagonism. As these cases may be regarded as a fair sample of the various points of harmony and alleged discord, between the Bible and Science, the reader will be able after finishing this article, to form at least an opinion as to the merits of the whole question.

The first case to which we refer is the marine character and origin of the earliest forms of animal life. Geologists unitedly tell us that animals first made their appearance in the seas and oceans, during what is termed the Silurian period; and that they consisted of Protozoans, Radiates, Mollusks, Articulates, and Vertebrates, or fishes. And that these existed in great abundance, long before terrestrial life was known, as the fossiliferous rocks of that period testify. With these facts before us, let us now turn to the record of Moses upon this subject. "And God said: Let the waters bring forth abundantly the moving creatures that hath life," etc. (Gen. i: 20.) Here it is distinctly stated that the very first forms of animal life were marine; so that upon this important point there is entire harmony between Science and Revelation. This fact, in view of the remoteness of the period in question, involving as it doubtless does untold millions of ages, makes this argument all the more marvelous. Now, how could Moses, without any knowledge of the Science of Geology, which was then unknown, have been able to divine whether the earliest forms of animal life were marine or terrestrial, unless he was divinely inspired? This is the only solution of the matter; for without inspiration, such knowledge would have been an utter impossibility.

Now let us take another case where it is alleged by certain physicists, biologists, and chemists, that there is unmistakable antagonism between the two. They claim that Science nowhere points out or affirms a Creator. That upon this subject it is as silent as the tomb. That so far as it speaks at all, it says implicitly: There is no God. That such a Being is not only *unknowable* but *unthinkable;* and as the Scriptures affirm the contrary, there is in this case a manifest contradiction. But let us look a little farther into this matter. Even admitting the eternity of matter as claimed by these writers that does not account for the vital principle of life in any form, which is distinct from, and is above matter; and which unquestionably had a beginning, and therefore must have had a Creator. The most pronounced Darwinian geologist must admit that any form of animal or even vegetable life was utterly impossible during the early part of the Archæan period. It is therefore evident that life and organization not only had a beginning, but that there must have been a Power of some kind and somewhere, equal to their production. Science must teach this, if it teaches anything; because it teaches *that* which makes this postulate a necessity. In fact, these scientists admit the absolute necessity of some *Power* to organize and vitalize matter, as we see it everywhere in forms of life and beauty. Professor Tyndall, a most pronounced Skeptic, in speaking of the achievements of science, says, The ground we have grasped and taken in, and enclosed within the last half-century, is all splendid it is magnificent knowledge. But he also says, It is above and beneath and around all this that the true mystery of the universe lies. When asked, is this mystery a Power? he answers, "Yes, it is a *Power.*"

Let us again turn to the Bible. It also declares that there is a Power outside of Nature, and above Nature that has organized and vitalized the numerous forms of animated beings. Thus far, even here, there is entire harmony. But just at this point Science stops, because it can go no further without leaving the material. Although it unfolds and reads with a surprising facility the fossiliferous record of its various stratifications; and grasps the magnificence of the heavens above, their mathematical adjustments, listening to the music of the spheres in wraped wonder, it sees nothing

beyond the physical, except a shadowy indefinable, mysterious *Power* somewhere, sufficient to account for natural phenomena. But of the nature and character of that Power, mere Science is dumb. Philosophy in all its material aspects is silent; "For no man has seen God at any time." Hence it is that all physicists who shut themselves up to the bare deductions of science find themselves perplexed and bewildered with insurmountable difficulties which will not down at their bidding, but which, ghost-like, meet them at every turn of the darkest part of the pathway of their investigations.

But all of this mystery is at once solved by the Scriptures, not by antagonizing science, but by taking a step in advance of all that is material—out and beyond its domain—out and beyond the farthest limits of the starry fields of the skies; where by their prophetic-telescopic visions, they sweep the heavens up to the very throne of the Eternal, revealing and affirming that this Power is a glorious personality; in a word that this power is God, the Creator of all things, and that He is our Father. Now in all of this there is no more antagonism or conflict than there is between the light of the moon and the sun; or between two parallel lines one of which chances to be longer than the other.

HAVERSTRAW, N. Y.

ANTECEDENT EQUIVALENT OF PRESENT ENERGY.

BY ELD. C. S. TOWNE.

I now proceed to notice the second proposition involved in the law of the Equivalence and Conservation of Energy, viz., that all present manifestations of energy must have an antecedent equivalent. We know that man as such has a beginning. We inquire, then, for the antecedent equivalent of human energy. We see that his body is evolved from the dust in the same manner as the bodies of the brutes. But they possess the same quality of the energy manifested by man. They can see, feel, hear and emit sounds, and move; and they can do all these with even greater proportionate power than man. But we instantly and always recognize the fact, that for some cause, man is infinitely superior to the brute. In what does this superiority consist? I answer, not alone in the growing expansiveness of spoken language, but in the use of *written* language it is that the infinity of the difference lies revealed to us. In the tracing of these mystic symbols we take up a clew which leads back through all historic-ages till we hear the voice of the eternal One, and read upon the stony tablets the revelation of His will to man. Underneath these opaque symbols we find the hiding place of a power which rises above all the handiwork of man: yea, higher than all the majesty of power revealed to us in the earth we tread and in the starry skies above us. This power is the energy of thought wording itself in written ideas, which, unconfined to the form of the person, flash out across all terrestrial distances to move to action other persons who may be a thousand miles beyond the circle of our personal presence. The silent thought or the spoken word may flash upward through celestial spaces to the very throne of heaven and move the compassionate heart and the helping hand in whose hollow is the hiding of omnipotence. We find that man may take the printed page and look beyond the seen and changing symbols to the unseen and eternal realities described by the written ideas. The child may look upon this page, and have no perception of the ideas; but there is within him an evolving energy of intellect reaching out for the attainment of knowledge; and the evolution moves on day by day, lifting the mind from one elevation of thought to another still higher, overlooking new fields of knowledge whose further limits are forever receding in the enchanting distances of an eternal future. There is nothing of all this in the brute; no amount of instruction can reveal to it the ideas that shine beneath the symbols of the printed page. The child can be educated to see these ideas; to grasp their far-reaching significations and use them in countless and ever-varying forms.

But the question arises, Is this power of man the evolutional result of his physical environment? Is the power of speaking these printed symbols an inherent faculty of his constitution, or developed in any degree from the resources of Nature? Can we find in her the perfect equivalent of these powers?

Experience and observation answer these questions promptly and decisively. Every infant child of the race must pass through many months of constant personal instruction aided by all its inherent powers of imitation, before it can speak plainly a single word, or express even a concrete idea. After this it must pass through many years of instruction before it can use the written language to perfection. This instruction, must always come from antecedent sources. This is a law as absolute in all human experience as the law of life. No life without antecedent life. No use of spoken and written language without an antecedent personal instructor. But we find that for all the energy manifested by the brute, there is an equivalent in Nature; for just as certainly as the animal is brought by the act of birth within the range of the energy known to be working in Nature, so certainly are the varied degrees of brute intelligence developed in perfection.

Note, in this connection, the following important fact. Human energy in its manifestations embraces two planes of action, viz., the silent plane, and the spoken and written plane. By the term 'silent,' I mean that all the operations in that plane may be carried on without the use of spoken or written ideas. Man and the brute occupy this plane in common: brutish action is confined to it alone; while human action reaches up and fills the higher plane of spoken and written energy. In man these planes merge into each other. The conscious ego who sees, feels, hears, and moves, also thinks, speaks, and writes along these infinite lines of progression that I have already pointed out. We cannot fail to see that the whole line of action belongs inseparably to one individual entity; that one indivisible personal consciousness flashes through all, from the simplest act of touch to the highest and most complex expression of thought. I want to fix indelibly in your minds the idea that in man these two planes of action are inseparably one in the continuity and relativity of their action, so that one sphere cannot be manifested without the other, in the fully-developed man. This fact, as I trust you will not fail to see, becomes a powerful argument for the existence of a personal and infinite God. We see in Nature an infinitely varied manifestation of superhuman power all belonging to the lower plane of silent energy. But we never find here any independent expressions of spoken thought and written language. We know there is nothing in all this visible universe which

can develop in any new-born child these spoken and written powers of thought and language. We must look above Nature and beyond it for the equivalent of these human powers. I think we may reasonably conclude that this silent energy in Nature is the same in kind as the human; for we find embodied in it light, heat, sound, and constant, tireless power of action and motion. But as the silent form of energy in man cannot be intelligently and happily manifested without the controlling presence of the higher, so we must conclude that this silent manifestation of energy in Nature is inseparably connected with an infinite Mind and Soul whose thoughts and spoken words are to us the unfailing fountain of all knowledge and wisdom and love. If the child of to-day cannot speak a word or use a written language without mother and years of example and instruction, much less must this have been possible at the beginning of the race, *specially if man were the evolutional product of antecedent physical Nature.* But if man were the child of an infinite, intelligent, and personal God, we have in that Being a competent instructor in whom we find the full equivalent of human thinking and speaking energy, and also its all-sufficient conservation.

Then, as we find in Nature an overflowing equivalent of human energy in its lower and silent plane only, and as this lower plane is inseparably connected with a higher plane of spoken thought and written language not found in Nature, but wholly acquired from antecedent instructors, we may be certain that above and beyond these mighty works of Nature we have indeed found a complete equivalent of the thinking energies manifested in the higher plane of man's spiritual and physical natures, his understanding and reasoning spirit, and his emotional, willing and loving soul. Then as these finite human planes of action embracing light-seeing, heart-feeling, sound-hearing, action-moving, thinking-speaking, and writing-reading, are universally and inseparably manifested in one human person, it must absolutely follow by a perfect analogy that the lower plane of action seen in Nature and embracing light, heat, sound, and motion, belongs inseparably to one infinite and superhuman Person who sees, feels, hears, and acts ubiquitously; who thinks omnisciently; who speaks omnipotently; writes with all authority, and reads universal Nature and all subordinate minds with unerring certainty. Therefore the law of the Equivalence and Conservation of Energy does declare by the highest authority, that there *is* a God, and in the human heart writes His attributes in lines of unfading light which even the degrading power of sin can never wholly blot out. The next step brings us within the range of the law of the Correlation of Forces.

WHEN AND WHY GOD WINKED AT IGNORANCE.

BY PROF. G. R. HAND.

"The times of this ignorance God winked at; but now commands all men everywhere to repent," Acts. xvii:30.

Unquestionably there have been times of ignorance at various periods of the world's history, and men have arisen to teach the ignorant; but whether they have been able to see their error and "repent," may perhaps be a mooted question, as applicable to the present, or any past age.

Historically and Scripturally, I shall limit the investigation to the particular period covered by the phrase: "The times of this ignorance," which spans over seven hundred years.

But why should God "wink at," or overlook this particular period of ignorance any more than ignorance in general? Clearly because God had given the world a problem to solve, more than seven hundred years before, and had allowed them all that time to prove that man cannot find out God by their own wisdom. God had said: "For the wisdom of their wise men shall perish, and the understanding of their prudent men shall be hid," Isa. xxix:14. This was uttered 712 years before the Christian era, and in view of the fact that their fear toward God was "taught by the precept of men."

This problem looks to the development of two kinds of religion. The one a religion based upon the discoveries, reasoning, and experience of men, in their vain attempts to find out God by wisdom. The other, a religion based upon the revelation of God to man, in His word. These may be placed in antithesis by the phrase: "Experimental religion" versus "Revealed religion."

Pending the solution of this problem of the race, God throws around the people of the Ionian Isles, the most favorable facilities for learning, until under the fostering influences of freedom and science, the Greeks became the most learned people the world ever saw.

If the idea that man can find out God, had been a plant of human cultivation, most assuredly it would have been developed in that soil. After a century of preparation, in clearing and grubbing, and planting, the era of Grecian Philosophy is inaugurated six hundred years before Christ, with Thales at the head of a long list of about thirty Philosophers, including such men as Pythagoras, Socrates, Plato, and Aristotle. It is a little remarkable that ancient Philosophy is exhausted in Grecian Philosophy, and that Grecian Philosophy exhausted itself inside the period covered by our phrase: "The times of this ignorance," or, within the six hundred years, from Thales to Christ.

That God should select this period, the most brilliant in philosophic discoveries, and sparkling with the diamond-like splendor of polished intellect, as the period in which to allow the representative intellect of the world to demonstrate the utter inability of man to find out God by his own wisdom, is wonderful indeed, from any other than a Providential standpoint.

With all these Philosophers, the great leading object of investigation, was to try to find out God, or as frequently expressed by themselves, "the source of all things."

Elevated upon the highest pedestal of science, this Greek nation was finally and within this period, elevated to the throne of the world's great empire, having conquered the Medo Persian Empire; and all the appliances of wealth, and power, and grandeur, and imperial influence, were laid under contribution at the feet of science and Philosophic discovery. What success they made in finding out God, may be gathered from Grecian Mythology.

Theistic investigation, evolved polytheism, pantheism, deism and atheism. But in the shafts and drifts of their mines in delving after Theism, they had succeeded in stumbling upon some thirty thousand gods, until it was once said by a facetious writer, that it was easier to find a god in Athens than to find a man—the greater gods being represented by temples, and the lesser ones at altars.

Pestilence rages in that city, and the smoke

from thousands of altars may be seen daily mingling and ascending as a grand holocaust to heaven, to propitiate the favor, and deprecate the wrath of their gods, but all to no purpose. The pestilence continues. There the melancholy fact is realized and admitted, that the representative wisdom of the world had failed to find out God. And in the pale grief of despair, they erect an altar "To THE UNKNOWN GOD," the inscription on which is the culmination of their ignorance, and their own acknowledgement of their failure to find out God.

Pending this brilliant period of man's efforts to find out God, and its splendid failure which remanded the experimental religion of the Philosophers to the shades, God was training another people on the problem of revealed religion. These, the Jews, were separated hundreds of miles from the Greeks, and without their philosophy. But, while God gave the Greeks some thirty learned Philosophers inside of the six hundred years of their probation and splendid labors on the problem, He gave nine prophets to the Jews in the same period, but under very different auspices. At the introduction of the brightest period of Grecian Philosophy, with Thales in the lead, God removes the Jews, a thousand miles farther away, into Babylonish captivity, for seventy years. But they are cured of idolatry, and trained in Monotheism through the revealed word of God.

Simultaneously their lines thus begin to trend in courses strangely divergent. The Greeks nestled in freedom in the bosom of the Ionian Isles, commence scaling the grandest heights of cultivated intellect, and Philosophic investigation, the world had ever seen; while the lights of Jewish supremacy, and regal splendor, at Jerusalem, are extinguished; and as a conquered people divested of privilege, and wealth, and splendor, they commence a downward career trending in the direction of a long, dreary, and gloomy bondage among the heathen.

But antithetical as these two races may appear from a human standpoint, they both had a mission from God, in working out the answer to His great problem.

Yet the strangely divergent lines of these two races are destined, after six hundred years, to converge and blend together. When in the fullness of time, the Greeks had failed with all their wisdom to find out God, and plead guilty to their failure, by publicly recording upon an altar "To THE UNKNOWN GOD" the sublime culmination of Philosophical ignorance, the Messiah comes, who had, through all the dark days of captivity, been promised by the Hebrew prophets. He comes to solve the long-pending problem of Deity and Humanity.

Comes He to the learned Greeks and in the wisdom of Philosophy? No; philosophy had exhausted her resources and failed. And God had promised to disparage the wisdom of men, because they had relied on "the precepts of men." Gathering around Him a company of illiterate fishermen, and unlearned Galileans, to be witnesses of His life and teaching and miracles, He finally qualifies them miraculously to preach Him to the world. Not one Philosopher, not one wise man, not one learned man among those called to the apostleship.

For some seven years these illiterate but inspired apostles preached Christ to the Jews only. He had promised to settle this question without the wisdom of men, which was done during the first seven years of apostle preaching. To this the apostle Paul refers when writing to the Corinthians, a church among the Greeks. He says: "For it is written, I will destroy the wisdom of the wise and bring to nothing the understanding of the prudent," 1 Cor. i: 19. Upon this he comments thus: "Where is the wise? where is the scribe? where is the disputer of this world? hath not God made foolish the wisdom of this world? For after that in the wisdom of God the world by wisdom knew not God, it pleased God by the foolishness of preaching to save them that believe." 1 Cor. i: 20–21.

Here the apostle says that God had done what He had promised more than seven hundred years before, and that He had done it without the Philosophers, or the learned men of this world, but through inspired illiterate Galileans. "For not many wise men after the flesh, not many mighty, not many noble are called. But God hath chosen the foolish things of the world to confound the wise."

Thus Paul reminds this Grecian church that God had fulfilled His promise, that in His wisdom He had permitted the world, for six hundred years, and in the most learned nation the world ever saw, to try its hand at finding out God and fail, and forever demonstrate the impossibility of finding out God except through His word. After that problem was settled, it pleased God by the foolishness of preaching the gospel, to save them that believe; and Greek Philosophy waned and Grecian Philosophers, having fulfilled their mission, disappeared from the earth.

Apostolic preaching of the gospel, "in demonstration of the Spirit and of power," for some seven years, had laid the foundation of their faith in God, not in the wisdom of men, but in the power of God; and the time had come for the divergent lines of the Jews and Greeks, to converge in Christ. Illiterate Jews, inspired of God, had laid the foundation among the Jews who "require signs," but now the Lord wants a man to go to the Greeks, who "seek after wisdom," and preach "Christ, the power of God and the wisdom of God." Looking to this service, Jesus had laid His hand upon Saul of Tarsus as His man. Learned in the Jewish literature, and familiar with the Greek Philosophy, and mythology, Saul can step into the college Philosophers, and discuss with them their abstruce questions; and from human or divine standpoint, clearly we have the right man in the right place, when Saul is divinely installed into the office of apostle to the Gentiles.

Now follow Paul to Athens, the literary Metropolis of the world; see Acts. xvii: 15–31. Here Christianity is brought face to face with Grecian Philosophy, in the hands of one who is familiar with both. Distributed over the great city are monumental evidences of the progress these Philosophers had made in their six hundred years labor on the problem of finding out God. Gloriously they had labored, made a splendid failure, and lapsed into idolatry. His eyes take in evidences of idolatrous worship on every street. He is antagonized by epicureanism and stoicism, two of the leading schools of Grecian Philosophy of the above period, which, though antagonistic to each other, could unite in opposing the gospel. The preaching of Jesus and the resurrection, was construed into "setting forth of strange gods," and curiosity is excited.

The learning of the world is represented at Athens, and Philosophers come there to report their discoveries, and to hear the report of discoveries made by others. In this spirit of inquiry,

they are anxious to hear Paul, and invite him to deliver an oration in the public forum before the court of the Areopagus.

These learned Philosophers are informed that they are too devotional; too much devoted to demon-worship; worship too many gods; that after a search of six hundred years, and the discovery of some thirty thousand gods, they had failed to find out God, and had gone to worshiping "an unknown god." Him, Paul has come to declare to them, a God that can be revealed and declared, but not found out by experimental philosophy; a "God that made the world and all things therein;" the very thing that Grecian Philosophers for six hundred years had been trying to discover, but which the Jews had by revelation in the first chapter of Genesis. The proprietor of heaven and earth does not need anything at our hands, but "gives to all life, and breath and all things," and has distributed the nations over the earth to seek the Lord, and even permitted them, if possible, to feel after Him and find Him. In this distribution, he had taught the Jews how to seek the Lord through His revealed word, but had permitted the Greeks to feel after Him and reason after Him in Nature and fail.

Some of these Philosophers had come to the conclusion that there must be an intelligent first cause of all things, and that "we are also His offspring." Paul quotes this on them, from their own accepted Poet, and then shows the absurdity of admitting that we are the offspring of God and yet supposing that the Deity can be represented by such images as they worshiped.

Having reached the culmination of their ignorance, and reduced their Mythology and idol-worship to absurdity, he coolly lays them in the shade, in utter amazement, with the grand climax: "And the times of this ignorance God winked at; but now commands all men everywhere to repent; because He hath appointed a day in the which He will judge the world in righteousness by that man whom He hath ordained, whereof He hath given assurance unto all men, in that He hath raised Him from the dead."

Having laid out the Greeks to cool amid the departed shades of giant intellects, our great apostle, and Christian Philosopher, turns and wraps the winding sheet around the retiring cotemporary, Judaism, and thus chants its requiem: "God who at sundry times and in divers manners in time past spoke to the fathers by the prophets, hath in these last days spoken to us by his Son," Heb. i: 1.

Now all ye Philosophers, who cut loose from the word of God, and seek to find God some other way, can ye not see that "the times of this ignorance," covers the brightest period of the world's history, during which God permitted the giant intellect of the world to try its hand and fail, but does not wink at your ignorance, for He now commands all men everywhere to repent, and follow the Christ a greater leader than all the Philosophers combined.

Thus God winked at the splendid period of Philosophical ignorance while, by divine permission, the representative of science without revelation, wrought his problem to its disastrous solution. But that period closed when the divergent lines of Jew and Greek, under the leadership of Christ, "the light of the world," had formed a permanent convergence in a common path illuminated by the light of revelation, which renders ignorance culpable and inexcusable.

The votary of Materialistic Philosphy, who has been delving in the dark and dreary depths of spontaneous generation and evolution, vainly searching for the potencies of life, and creative possibilities, among the impotencies and impossibilities of blind unconscious matter, may here take up the cue and follow it through the labyrinths of beauty and grandeur and sublimity, in the great machine shop of creation, and with the aid of the light from both volumes, science and revelation, see constantly rising before him, in ever varying forms, corroborative evidences, and innumerable manifestations of creative power and providential wisdom, until THE PROBLEM OF HUMAN LIFE HERE AND HEREAFTER shall no longer sojourn in the nebulous realms of hypothetical postulata, but, like a demonstrated proposition in Euclid, may be rounded up with a triumphant Q. E. D.

RICHMOND, MO.

SPIRITUALISM: A DELUSION OF THE DEVIL.

BY REV. S. C. LITTLEPAGE, D. D.

DEAR WILFORD: Your article in the February number of THE MICROCOSM calls to mind a duty imposed in our ordination vows; that is, "To drive away all erroneous and strange doctrines;" for this purpose I know of no better medium than THE MICROCOSM. Indeed this appears to be its special mission.

In the first place it is a significant fact that spiritualists, as a class, deny the existence of a personal devil, while many of the more advanced and philosophic among them deny the existence of a personal God.

The existence of spiritualists as a class of deceivers is a fact of prophecy, and therefore confirms the truth of the Bible; St. Paul says, "Now the Spirit speaketh expressly that in the latter days some shall depart from the faith, giving heed to seducing spirits and doctrines of devils speaking lies in hypocricy. * * * Forbidding to marry and commanding to abstain from meats" 1 Tim. iv: 1, 2, 3. This prophecy is not only fulfilled in the rise and character of spiritualism, but the philosophy of the delusion is given; no one was ever carried away by it who did not first "depart from the faith." A desire for other evidence than God has been pleased to give, has been the entering-wedge of many a heresy, and for such there seems to be a proneness in our fallen human nature. The Apostate Jews required a sign of Christ while the very works of God were taught in their midst by Him. Dives wished to have one from the dead sent to his brethren. Christ refused to gratify the Jews, and Abraham declined the request of the lost rich man; not from any unkindness in either, but from the fact that God's methods are wiser than man's, and more effective. If the best measures fail, inferior ones are useless; besides since God has revealed Himself, His will and grace bring life and immortality to light in the gospel. For a man to turn from His word and Spirit and seek through mediumistic agencies to ascertain the truth of what He declares, is to insult His veracity, wisdom and love, "Grieve the Holy Spirit," and enter the dominion of the devil as the willing dupes of his deceptive power.

Now I have no faith in the devil, but I have a knowledge of his devices which have cost me dearly, and gladly would I recover anyone from his snares. The apparently ugly and uncharitable caption of this article is selected in all kindness; the truth is I entered upon the investigation of spiritualism in Central America in the summer of 1869 and continued my researches for several suc-

cessive years, in Washington City, New York, St. Louis, and elsewhere, for the purpose of saving a beloved Brother with whom I was associated and who was anxious to believe it true. I was anxious if it were true to ascertain the fact, with a strong persuasion that it was a delusion of the devil from the fact that it antagonized every vital principle of Christianity.

I prosecuted my investigations by ascertaining the mental and moral processes by which a belief in the theory is reached, and its effect on the moral character of those who embrace it. This was done by free personal contact and conversation with the most cultured and advanced Spiritualists I could find in my extended travels; and my judgment is, that no tree in the moral universe bears so uniformly such evil fruit as Spiritualism. It germinates in doubt of God's truth and ripens the blank negations of Atheism as its maturest fruit. It is more to be deplored than Atheism, if possible, from the fact that it so frequently leads to insanity. Indeed, it has been decided by many physicians to be a species of insanity.

The faith faculty of the human soul, by which alone spiritual truth can be ascertained, when it turns from God and His word and seeks to ascertain spiritual things through this diabolical agency, becomes perverted and is open to the temptations of the devil, and there is no limit known to his seductive wiles. The marvelous gullibility of a soul in such a state is one of the most marked phenomena of all that accompanies this delusion. Hence the wide-spread effects following the performances of tricksters who do not scruple to resort to any method that enables them to gull the people and drive their own business; and though their tricks have been detected and their frauds exposed, still the people will believe "there must be something in it." This desire to believe the doctrine true, in most cases arises from a desire to ignore a sense of personal responsibility to a just and Holy God. This is instigated by the devil "who was a murderer from the beginning and abode not in the truth," and has been murdering and deceiving on to the present.

If it were possible for a disembodied spirit to become materialized, as it is claimed, so as to be seen and hold conversation with men in the flesh it would be impossible to distinguish between actual spirit manifestations and the creations of a disordered mental organism.

A most remarkable illustration of the truth of this proposition came under my own observation in the city of New York in the winter of 1869. My brother C. V. L. had been ill for some days, when very quietly turning to me he remarked, "My wife is dead;" I asked him why he thought so; "I think nothing about it," said he, "I know it, for she is here with me and has been for several days." I reminded him that he was sick; he replied, "I know I am somewhat ill, but I am in my right mind; test me in any way you please. If I am not as rational as I ever was in my life I am very much mistaken;" and, indeed, he appeared to be so, as far as I could determine.

I tried to dispel the illusion from his mind but could not. He said, "I see her as plainly as I see you; I have been conversing with her as intelligently as I ever did in my life, and then she has described the circumstances attending her death so naturally that it is impossible for me to be deceived. Besides, she gives the philosophy of the spirit state in such perfect accordance with my conception of it that I am fully satisfied. She now looks upon you and smiles to see you so gross as not to be able to apprehend her presence. She has been trying to attract your attention for some time; says you will become so developed as to be able to converse with her. She tells me that she started from her mother's near Austin, Texas, to visit our former home in San Marcos, but on entering the San Marcos River, the horses became frightened, upset the buggy, and she and two of our children were drowned. As soon as she entered the spirit state she knew my condition and came immediately to my relief, and has been with me ever since, except during a brief visit made to her sister in Guatemala, C. A.; but traveling almost with the velocity of thought, her absence was scarcely appreciable."

I tried to divert his attention from the subject and urged the importance of his recovery, when he manifested some impatience and replied, "This will not interfere with my recovery. I cannot say that I regret her death; it is all right; I shall miss her in the flesh, of course, if I get well, but she will be with me in her spirit-form all the while." Upon my suggesting the possibility of hallucination, he replied, "If a man cannot believe the concurrent testimony of three of the five senses, what can he believe? I see her with my natural eyes, I hear her with my natural ears, I feel her hand in mine as sensibly as I ever did, and this during several successive days. Don't talk to me about delusion in such a case as this!" There was no meeting such arguments; the truth is I was silenced, and astounded, for he was a man of a strong analytical mind, and "the very soul of honor," and I had never seen him appear more calm and rational than at this time. His interviews with his wife appeared to be continued through several successive days, and to be very gratifying to him; of course I could do nothing but accept the truth of spiritualism if this extraordinary phenomenon should be corroborated by physical facts; but unfortunately for this fine demonstration, within about ten days we received a letter from his wife from which we learned that she had never made the contemplated trip to San Marcos, knew nothing of her husband's sickness in N. Y., or the "philosophy of the spirit state."

Both are now in the spirit-world having survived the above recorded event several years, and much of their misfortune is justly traceable to this miserable delusion from whose spell few ever escape. Strange to say, my brother would not talk of this N. Y., hallucination, but sought other "tests," as is usually the case. Whether he ever became convinced I never knew, as he died in the city of Guatemala a few years since while I was stationed in Houston, Tex.

Of course I would not draw on the privacy of family history, but for the hope of saving some endangered soul from the snare of the devil.

Now let us admit the doctrine of "*total* depravity," and accept the truth of Scripture that men "love darkness rather than light;" can any man suppose that this insatiable hunger for anything but the bread of life; that this restless, impatient grasping for every thing that is false in science, philosophy, and religion, can be accounted for on any other hypothesis than the active agency of a personal, malignant devil, "the accurser of the brethren," and the deceiver of the world; who used to go about "as a roaring lion," but now generally as a wolf in sheep's clothing, or a squat at pine tables, as Milton's toad at the ear of Eve? I confess I cannot. I think too much of our poor

fallen nature, bad as it is, to hold it capable of such greed of self-deception but for the influence of this malignant foe.

Let any man take a seat, sit mum and unknown, for half an hour, as I have done at some head-quarters of Spiritualism, and listen to the talk of a group of itinerant lecturers, mediums, physical and spiritual, if he wishes to become convinced that these are the apostles of the prince of darkness. Or if one could set before us the statistics of ruined fortunes, blighted homes, crazed brains, and lost virtue, traceable to Spiritualism alone, who could resist the conviction that the enemy who hath sown these tares among the wheat of the Lord's planting is the *devil?* While the good that Spiritualism has done could be written in bold characters on the blank side of a postage stamp.

FAIRFIELD, TEX.

CALL FOR A CONVENTION.

BY REV. J. I. SWANDER, A.M.

TIFFIN, OHIO, April 2, 1883.

A. WILFORD HALL, Ph. D.:—Please permit me to suggest that arrangements be made for a convention, open to all who are favorably disposed toward the new philosophy advanced in the *Problem of Human Life*, and advocated in THE MICROCOSM. What say you upon the subject? It seems to me eminently proper that we should celebrate the recent achievements of the past and prepare ourselves for the consequent responsibilities of the near future.

The position which you have taken and maintained for several years is no longer looked upon as one of amusing novelty, neither is your *Problem* regarded as the product of a roving adventurer in search of notoriety. The prodigals are returning. Just *when* and *how* the fatted calf of the wave-theory should be disposed of, are questions respectfully submitted to the mercy and wisdom of the above proposed convention. It seems to me that such a convention could be made fruitful in good results. You have furnished the "substance" for a new philosophy in Physics; should not the young and enthusiastic disciples of the new school be allowed to meet and participate in the appropriate ceremonies of placing the corner-stone in the foundation of the edifice already in the process of erection? Neither should the proposed occasion be looked upon as one of mere mutual edification and pleasure. There is work to be done before all the fundamental principles and logical deductions of this substantial philosophy are fully formulated into a system, and the superstructure caused to stand forth, firm in its foundation of rock-ribbed truth, fair in its proportions of beautiful consistency, rich in the treasures of its benefit to man, and devout in its proclamations of glory to a *personal* God in the highest.

Will you lay the matter before the readers of THE MICROCOSM, and invite a free expression of sentiment upon the subject? How would August, 1884, as to time, and Chautauqua, as to place, meet with approval from those who may be friendly to the proposed convention? Some point further South and West would be more central, and have in its favor the fact that many of your most able contributors and intelligent readers reside in those sections of our country; yet, in behalf of Chautauqua, it may be said that it is the literary center of summer resorts, and therefore an appropriate place for a grand jubilee over the rich discoveries of science and the recent triumphs of truth.

Let there be one session of the convention each day—say for four days. Let the first three sessions be open for the discussion in philosophy, of questions or topics, previously assigned, by a competent committee on arrangements, to men of acknowledged ability and scholarly reputation, whose duty it shall be to give the cues to the respective discussions, by the reading of appropriate papers, or the delivery of addresses, to be followed by members of the convention in a further consideration of the subject assigned for the day. Let the last day's session be devoted (1) to *business*. There is a demand for a new text-book in the regenerated science of acoustics. To bring out such a book will require talent, time and funds. It is not right that you should, at your own continued expense, be expected to bear the burden and the heat of the day, while thousands are reaping and enjoying the benefits of your great discoveries. (2). *Social enjoyment.* Let there be "a feast of reason and a flow of *Soul*,"—provided the soul has the *flowing* property under the recent definition of "substance." (How is it Mr. Editor?) In either case, I would suggest that nothing more stimulating than soul be allowed to flow upon the proposed occasion. The programme can still be liberal enough to include refreshments for the "outer man which perisheth." Toasts should be selected with taste, assigned in advance and responded to with brevity, that there may be no infringing upon the time allowed for the molary motion of mastication. I have suggested "molary motion" as a substitute for "molecular motion," Mr. Editor, because I recollect that the latter, as so frequently served in the monkey-diet of the Scientists, is not among your most relishable dishes. What say you to the foregoing suggestions? Yours, &c.,

J. I. SWANDER.

FALSE ASSUMPTIONS OF EVOLUTIONISTS.

BY PROF. I. L. KEPHART, A.M.

To lovers of truth, a physical fact is as sacred as a moral principle. Both are truths, and as such, they can never antagonize each other. No lover of truth takes issue with evolution as originally taught by Döllinger and his pupils, Karl Ernst von Baer and Pander. By thorough investigation they discovered the fact that "all living beings produce eggs, and that these eggs contain a yolk-substance out of which new beings, *identical with their parents*, are evolved by a succession of gradual changes." This is evolution *substantiated by the facts of Science.* Its fundamental law is "a law controlling types within appointed cycles of growth, which revolve ever upon themselves, returning at appointed intervals to the same starting-point and repeating through a succession of phases the same course." It admits of the improvement of types and of individuals; but the cycles have never been known to pass into each other, and the adherents of evolution, as defined above, will refuse to admit that they do pass into each other until *facts* are produced to substantiate such a claim.

But how vastly this differs from the evolution of Darwin and Haeckel. One of the fundamental assumptions of their theory is the transmutation of types. To support this assumption they present a vast array of facts respecting the changes animals undergo under domestication; and, in his Pan-

genesis, Mr. Darwin jumps to the conclusion that because animals do undergo great changes in domestication; because there is such a thing as metamorphosis; because climate, external conditions, natural preferences and proclivities, among animals, do influence the results in breeding (facts which no naturalist thinks of denying), that, therefore, one species does evolve another. And yet, despite all the investigation on this subject for the last thirty years, not a singe *fact* has been produced to substantiate this conclusion. To reach it, Mr. Darwin had to overstep the boundaries of actual knowledge and draw on his imagination to supply the links which science fails to furnish.

Not only are there no facts as yet discovered to substantiate the conclusion referred to; but Louis Agassiz declares that, "our domesticated animals, with all their breeds and varieties, have never been traced back to anything but their own species, nor have artificial varieties failed to revert to the wild stock when left to themselves. Darwin's works and those of his followers, have added nothing new to our previous knowledge concerning the origin of man and his associates in the domestic life, the horse, the cow, the dog, the sheep, or, indeed of any animal, * *. The reader seeks in vain for any evidence of a transition between man and his fellow creatures. Indeed, both with Darwin and his followers, a great part of the argument is purely negative. It rests partly upon the *assumption* that, in the succession of ages, just those transition types have dropped out from the geological record which would have proved the Darwinian conclusion had these types been preserved, and that in the living animal the process of transition is too subtle for detection. Darwin and his followers then throw off the responsibility of proof with respect to embryonic growth and geological succession."

Is it not strange that the great apostles of Darwinian evolution, although they still stand convicted of this grave charge, boast that evolution is an established scientific fact? This they do and still pretentiously claim to be strictly scientific? But, so far as the existence and the production of "the missing link" necessary to establish their theory is concerned, unfounded assumption seems to be their chief stock in trade. About 1870 the celebrated Russian investigator, Kowalevsky, announced that he had discovered that the so-called soft-shelled clams showed, in the course of their growth, a string of cells corresponding to the dorsal cord in Vertebrates. This announcement was hailed with unbounded delight by the friends of transmutation. At last the "missing link," the point of transition from the lower to the higher animal was found, and now man could be traced back to the Ascidians! Even Darwin himself, and all his ardent followers, greeted this announcement as direct evidence of structural affinity between the Vertebrates and the lower animals.

But their exultation was doomed to be of short duration. In due time the veteran German Scientist, K. E. Von Baer, disgusted with this unfounded, pretentious claim, stepped to the front and with a precision and conclusiveness that defied contradiction, showed that "the actual development of the Ascidians has no true homology with that of Vertebrates; that the string of cells in the former—compared to the dorsal cord of the latter—does not run along the back at all, but is placed on the ventral side of the body." Thus, was this bold assumption that was triumphantly to bridge over the chasm for Darwinian evolution, summarily disposed of. It was a rude shock to the hopes of the apostles of the theory.

Some time after this a wonderful discovery was announced by Prof. Haeckel—a discovery that was to establish as a scientific fact the transmutation of species. This renowned scientist claimed to have discovered that "star-fishes are compound animals, made up of worm-like beings united like rays in one organism." This was hailed as establishing, beyond doubt, the transition from Radiates to Articulates. But as Von Baer with a single effort, demolished the hopes that were hung on "the string of cells" discovered in the Ascidians, so Louis Agassiz, in a like summary manner disposed of the star-fish mare's nest, by asserting that, "there is not the slightest foundation for this assumption in the structure of the star-fish." He says: "The arms of these animals are made up of the same parts as the verticle zones of the sea-urchins and of all the Radiates, and have no resemblance whatever to the structure of worms. * * * The homology between a sea-urchin and a star-fish is complete; if one is an organic unit, the other must be so also, and no one ever suggested that the sea-urchin was anything but a single organism." Thus another bold assumption designed to substantiate the claims of Darwinian evolution is exploded.

Is it not strange that, in the face of the explosion of the assumptions with which it was hoped to maintain modern evolution, eminent divines should declare that it is an established science? The fact is, it may be asserted without fear of successful contradiction, that all that is asserted by evolutionists about "survival of the fittest," in so far as it is claimed to substantiate the transmutation theory, is nothing but baseless assumption. Despite the pretentious claims of evolutionists respecting such change, the absolute fact is "*the primitive types have remained permanent and unchanged,*—in the long succession of ages amid all the appearance and disappearance of kinds, the fading away of one species and the coming in of another—from the earliest geological periods to the present day." So declared Louis Agassiz in Jan., 1874. He further said: "How these types were first introduced, how the species which have successively represented them have replaced one another, these are the vital questions to which no answer has been given. We are as far away from any satisfactory solution of this problem as if developement theories had never been discussed."

What a terrible rebuke those grand words of the world-renowned scientist, wring out to the pretentious claims of "Origin of Species," "Pangenesis," and "The Descent of Man." How humiliating the *fact* he asserts to the pretentious claims of those who boast that, "evolution is an established science."

LEBANON, PA.

DOES NATURE FURNISH EVIDENCE OF IMMORTALITY.—No. 2.

BY ISAAC HOFFER, ESQ.

Having endeavored to show that mind is a reality—that it has as certain, as positive an existence as matter or any other force in nature, it remains to show what evidence nature furnishes to justify the belief in immortality.

The indestructibility of matter and the persistence of force are almost universally conceded. We are not able to conceive how matter or force can become non-existent. The annihilation of a thing is unthinkable. The mind cannot follow

the possible process, nor comprehend the result. It is impossible to conceive of something coming to nothing. If we could conceive how one iota of a thing might come to nothing we could conceive how the whole universe could come to nothing. The fact that matter is indestructible and annihilation inconceivable, furnishes the strongest circumstantial and analogous evidence of theind estructibility of mind that could be given in any case.

The destruction of an organism destroys no matter, and is no evidence of the destruction of any of the parts that constituted the organism or of the powers that operated in it. When a precedent condition exists that shapes the organism for the occupancy and operation of a particular power, the ultimate purpose of that power is not determined by the organism.

The nature and the characteristics of the power are more likely to furnish the indications and evidence of its ultimate purpose than the organism in which it operates. The destruction of a seed, when the vital action begins the building of a plant, is not the work of death, but the effect of life; nor is the destruction of man's organism any evidence that his mental activities have come to an end. The material part of an organism is in an abnormal condition—the mental part is not in that condition in the same sense; the latter is not composed of elementary constituents, not adjusted to the material, and not a dead thing vitalized, nor an inert thing brought into action. There is, hence, no diffusion and redistribution of parts, and no change but that of relation when the separation takes place.

Mind is only known as a monad of energy and activity—a self-acting, self-developing power—stamping its mark of individuality on life as effectually as life stamps its individuality on matter, thereby showing that individuality is its elementary condition, and that it cannot be resolved into anything less. Mind has attributes and faculties but no constituent parts; and that which has no parts cannot be parted.

The mind being an elementary individuality and therefore indivisible, and annihilation inconceivable—not possible in consciousness, the only test we have—and matter conceded to be indestructible, the continuity of mind in a future state of activity, seems to be a perfectly rational conclusion. It is impossible to believe in the diffusion or destruction of mind, because we cannot conceive the process nor the result; we are, therefore, compelled to believe in its continued existence as a complete whole, or deny its reality and thereby ignore our consciousness of self.

But we cannot disregard our own consciousness, nor discredit the existence of our own minds. The belief in a future state of mental activity is not only justified by Nature's manifestations, but is unavoidable; for if the division and annihilation of mind are inconceivable, then its continuance as a whole is the only possible conclusion that can reasonably be founded.

Mind being a percipient of knowledge, and a self-developing power, in which capacity seems to increase with acquisition, and want with supply—having capacity for unlimited development its wants and desires cannot be satisfied in its limited scope of action in a material organism. Every thinking mind is conscious of this fact, and hence the desire for continued existence and greater development. This desire is not a mere matter of education, for it has prevailed among the people of all nations, in all ages, and among all classes, from the most ignorant to the most enlightened. No one ever realized that the mind had arrived at full and mature development, or that its destiny was fulfilled. This shows a condition of mind not fulfilled and incapable of fulfillment in this life; and as Nature makes no conditions which she does not fulfill, it is but reasonable to believe that she will make provision for the fulfillment of all the conditions of mind after this life; that she will enlarge the scope of action, open the gates of knowledge, and free the encumbered activities, and thereby satisfy the universal and irrepressible desire for continued existence and greater development. Whether this desire is primarily in the constitution of mind, or whether it springs from the experience of pleasure and pain, does not change the fact of its existence. And its existence necessitates an inherent and natural capacity for desiring, and a proper condition in Nature for the exercise of this capacity. This desire therefore belongs to Nature and is a part of her, just as certainly, as man is; and if Nature is consistent with herself, this desire cannot be a delusion.

Nature cannot indicate something where there is nothing. She cannot provide conditions in which desires for continued existence and ideas of future activity are developed unless there is something of the kind—unless there is more than a probability for the realization of such desires and ideas.

There are activities in Nature, that, as far as man knows, are ceaseless in action and endless in duration. The persistence of force and the continuity of motion are considered established beyond a reasonable doubt. The primary cause of motion—the source of action manifested in the activities of Nature—must therefore also continue in ceaseless exertion—an endless, impelling energy. Mind, in its manifestation, is a typical representation, in kind if not in degree, of that primary power from which motion and the activities of Nature proceed. If two powers are similar in their modes of action and manner of operation, they must have similar conditions. The conditions of the power in a teakettle, and those of that in a thousand horse-power engine, are precisely the same, notwithstanding the great difference in the force exerted. It is a condition of primary force and consequent motion to be persistent and continuous, as has already been shown; and it is a perfectly rational conclusion that a similar power has the same conditions; and that, therefore, mind also is persistent and continuous.

The forces of Nature manifest in their actions a gradual and almost impreceptible passage from one into the other—an evolving of one force out of another—so that the line of demarkation can hardly be drawn.

Physical force manifests only motion either repelling or attracting in its action. Chemical force directs and controls motion to a certain extent. Vital force takes charge of motion, and chemical direction and controls and compels the performance of special and definite actions. Mental force comprehends all the other forces and asserts its superiority by converting them into subservient agencies, and by changing and transforming even the works of Nature. It is difficult to draw the line where chemical force comes in to control the physical; and still more difficult to define the division between the chemical and the vital; and between the vital and mental, the close interaction seems to hide almost entirely the line of demark-

ation. The formative action in crystalization foreshadows the organizing power in vital force. The individuating tendences in plants, although they are still rooted to the Earth, indicate the locomotion developed in animals. The feeble signs of sensation in plant-life foreshadow the sensitive and conscious nature in animal life. The sensitive and conscious nature of animals clearly indicates a developing tendency toward a thinking, reasoning intelligence. This gradual evolving of one force out of another, this foreshadowing in one force what the prominent characteristic of the next will be; and the systematic, developed results of these forces attest the prophetic actions in Nature, and assert the fact that the foreshadowing in these actions will be realized.

The history of progress in the material world corresponds with the progressive development of the forces of Nature. Geology tells us "that the "reality of an age in the history of progress is "marked by the development of some new ideas in "its system. That the beginning of the charac-"teristics of an age is to be looked for in the "midst of a preceding age: and the marks of the "future coming out to view, are prophetic of that "future. The age of coal plants was preceded by the "occurance of related plants far back in the De-"vonian. The age of Mammals was foreshadowed "by the appearance of mammals long before in "the course of the Reptilian Age. And the Age of "Reptiles was prophesied in types that lived in "the earlier carboniferous age. Fundamental "forms of structure and prophetic types of plants "and animals, now fully developed can be traced "back into past Geological ages."

This shows that in the progress of life, as well as in the development of the forces of Nature there was constantly a foreshadowing in each order, of that which became a developed fact in a succeeding order; and although the progressive evolution in life seems to have culminated in man, the past history of unremitting progress in all things is the surest evidence of its continuance. It is not in accordance with the immutable laws of Nature that this progressive evolution should come to a halt, nor that its past history should be no longer safe data for future calculations. The progressive development in the forces of Nature from simple motion to grandest thoughts; and the corresponding evolution in the material world and in the kingdom of life, from a shapeless and confused mass, to well-defined features and systematic order; and from almost featureless forms to the most complicated organisms, show the systematic and continuous actions, and the certain and specific results of Nature's activities in the past, and give assurance of continued progressive activity and corresponding results in the future.

Since the appearance of man, the progressive tendencies in life seem to have been transferred to mind. Mind now is the progressive power that would constantly bring about new orders of things. It is not satisfied with the works of Nature as they are, but is continually changing and transforming them. It does not even remain within the bounds of physical possibilities, but it transcends beyond, and extends its operations into the realms of physical impossibilities. It defies the limits of time and space. In one moment it passes over all parts of the earth, and in the next it moves among the heavenly bodies. It goes back into the dim past and reviews the ages that have gone, and it spies out the mysteries of the hidden future, regardless of the impossibility to recall a past moment or to grasp a future minute.

The greater part of our mental operations are never materially represented, and yet they are as much an activity and as much a reality as those that are manifested through physical agencies.

These mental operations show the powers and capabilities of mind to reach over and beyond all physical possibilities, notwithstanding its seeming limited scope of action in the organism. They show an unmistakable tendency in mind to act independently of all physical agencies; they show a progressive developing toward a higher order of intelligence, a greater independence, and a larger scope of action; and they indicate and point out very clearly a possible future state and condition, in which physical capabilities are not considered and with which they have nothing to do. In none of these past ages were the foreshadowings such clear, distinct, and well-defined indications of the order of things which followed as are these mental manifestations of the present age. These point out the direction in which the progressive development is moving, and show the fundamental outlinings of the order of activity in the next link in the chain of progress.

It is true that we can only judge of the future by what we know of the past; that we cannot tangibly see nor physically present events to come; but we have learned to know the system and order of the past in many things, so that we can predict their recurrence in the future. We have learned to know the immutability of the laws of Nature, and to trust these laws with the fullest reliance.

In the midst of Winter we have no doubt of the coming Summer, and we are confident that the leafless trees will again be covered with foliage in the proper season.

When we see that it has been the order of Nature to be progressive from the earliest time to the present, we can have no doubt of the continuance of this order in the future.

When we see that during all past time Nature indicated by some fundamental markings in each age that which became a developed, prominent characteristic in the succeeding age, we have every reason to believe that this law of fundamental outlining is as reliable and immutable as any of her other laws.

We can trace step by step the progressive development from simple sensation in the lowest orders of animal life to the highest powers of a thinking, reasoning intelligence in man; and in every step we can see, not only the advance toward a higher intelligence, but a persistent tendency—pointing ahead of the advances made—to a still higher intellectual condition;—a continuous reaching forward toward mental ascendency and mental independence, until in man the psychical dominates the physical.

Here physical development seems to have reached a culminating point. The fundamental structures in life have become fully developed; there are no longer any indications of progressive physical evolution, and no foreshadowings of a higher order of life, so far as we can see.

In the psychical, however, the tendency toward greater development, and toward a higher and more independent intellectual condition, continues unabated. The outlining of the future is more definite and more distinct in this age of man than it was in any previous age.

The innate and unmanifested mental operations; the reaching out in thought beyond physical possibilities, the sense of incompleteness and insufficient

scope of action, and consequent universal and irrepressible desire for continued existence and relief from physical wants and imperfections, are mental states which testify that in this life the conditions of mind cannot be satisfied; that it cannot be developed to the extent which its capacities and its powers indicate; and that there can be a higher order of mental activity than is possible in a physical personality.

This higher order of mental activity is indicated and pointed out by these mental states more clearly and more distinctly than the foreshadowings in in any of the former stages of progress; and if the facts of the past can be taken as a guide for the future—if the reliability of the laws of Nature can be trusted— then the development and realization of the clear and well-defined fundamental markings of the present age, which point out that higher order of mental activity where the physical and psychical are separated, can be relied upon and should be believed.

These are not mere indications that justify the belief in a future state of activity, but logical and rational conclusions, deduced from the facts of the past history of progress in Nature, and sustained by the immutability of her laws; so that there is no reasonable ground for doubting the continued existence of the mental part of man's organism in a changed relation, in which the mental capabilities and powers are fully developed and the mental conditions are all fulfilled; and where the prophetic indications of mental perfection in continued activity, unencumbered by physical agencies and imperfections, and unrestrained by physical impossibilities, are fully realized.

LEBANON, PA.

ELECTRICITY THE MOTOR POWER OF THE SOLAR SYSTEM.—No. X.

BY B. T. KAVANAUGH, M.D., D.D.

EFFECTS OF ELECTRICITY ON MEN AND ANIMALS.

(*Continued.*)

In my last article on this subject it was shown that the force, by which the blood was circulated through the bodies of men and animals, is not derived from the physical expansions and contractions of the heart, but from the force of electro-magnetism contained within the blood. This magnetism is imparted to the nervous system from the blood as it passes through the arteries, and is transferred thereby to the brain.

In the present article we shall attempt to show that electricity forms an intermediate agency between mind and matter, and is the only medium through which mind can connect itself with, and control the action of the physical system.

When we come to consider the subtle and indefinable character of electricity, it is impossible to class it wholly as belonging to either material or spiritual substances, but it really partakes in the nature of both, and is an intermediate link between, and thus it is capable of receiving the impressions and forces of mind on the one hand, and of imparting them to the most refined and delicate parts of animated existences on the other.

The whole nervous system may be justly regarded as an electrical apparatus, receiving and distributing along its lines, by electrical agency, both the motor and sensational functions of that system. The brain, therefore, thus stimulated and vitalized by the action of the electric fluid, as a living spirit is endowed with volition, will, and elastic action.

Mr. Dods makes the following remarks on this subject: "Mind is the only substance in the universe that possesses inherent *motion* and living *power* as its two *primeval efficients*. These two seem to be inseparable, because there can be no manifestation of power except through motion. Hence, mind is the first grand moving cause. It is the first link in the magnificent chain of existing substances. This mind wills. This mental energy as the creative force is the second link, and stirs the nervous force which is electricity. This is the third link. This electricity causes the nerves to vibrate. This is the fourth link. The vibration of the nerves contracts the fiber of the muscle. This is the fifth link. The contraction of the muscle raises the bone of the arm. This is the sixth link. And the arm raises dead matter. This is the seventh link. So it is through a chain of seven links that mind comes in contact with dead matter, if we allow the creative force—the will to be one link; this will, however, is not a substance, but a mere energy or result of mind. To be plain, it is mind that touches electricity, electricity touches nerve, nerve touches muscle, muscle touches bone, and bone raises dead matter. It is, therefore, through this concatenation or chain, link by link, that the mind gives motion to and controls living or dead matter, and not by direct contact with all substances. Hence the proof is clear and positive that the mind can come in contact with, and by its volition control, the electricity of the body, and collect the subtle agent with fearful power upon any part of the system.

"It is evident that the mind holds its residence in the brain, and that it is not diffused over the whole system. Were it not so, then our hands and feet would think; and, in case they were amputated, we should lose part of our mind. If then, the mind, invested with royalty, is enthroned in the brain, and if the mind commands the foot to move or the hand to rise, then it must start forth from its presence an agent, as its prime minister, to execute this command. This prime minister is electricity, which passes from the brain through the nerves as so many telegraphic wires, to give motion to the extremities. On this principle how easy it is to understand the philosophy of a paralysis. The nerve, as the grand conductor of the motive-power, is obstructed by some spasmodic collapse, and the prime minister cannot pass the barrier that obstructs its path. In this case the mind, as the enthroned monarch, may will the arm to rise, but the arm remains motionless; but remove that barrier, the agent passes and the arm must rise. Hence, it is easily seen that all motion and power originate in mind.

"I have now brought before you the connecting link between mind and matter, and through this have shown you the philosophy of the contraction of the human muscle through mental energy. This has ever been, and still is, considered an inscrutable mystery in physiology * * * * * I have already stated that the brain is the fountain of the nervous system, and that both its hemispheres are a congeries of nerves. They both pass to the cerebellum; and the spinal marrow continued to the bottom of the trunk is but the brain continued. In the spinal marrow, which is the grand conductor from the brain, is lodged the whole strength of the system. From this spinal marrow branch out thirty-two pairs of nerves, embracing the nerves of motion and those of sensation. From these branch out others, and others again from these, and so on until they are spread out over the human system in network so infinitely fine that

we cannot put down the point of a needle without feeling it—and we cannot feel unless we touch a nerve. We see, therefore, how inconceivably fine the nervous system is. In all these millions of nerves there is no blood. They contain the electric fluid only, while the blood is confined to the arteries and veins. I am well aware that blood vessels pass round among the convolutions of the brain, and through them the blood flows freely to give that mighty organ action; but in the nerves themselves there is no blood. They are the residence of the living mind, and its prime agent, the electric fluid."

The effects of electricity upon different persons is not always the same. Those of delicate form and of nervo-sanguinary temperaments cannot bear as much as those of bilio-lymphatic temperaments. I published an article in the *Family Visitor*, in Houston, some years ago, on this subject, which being read by a minister of the nervo-sanguine temperament, he wrote me on the subject and said: "I have read and believe in your theory on electricity; but there is one question I should like to ask you; it is this: What is the reason that I cannot sleep at night, if my body lies north and south, as well as when I lie east and west?"

The following answer was given through the same paper: "When you lie north and south, there is a current of electricity passing around your body, which creates a polarity; and if your head is to the north there is an accumulation of positive electricity upon your brain which renders it too active for repose in sleep."

When this answer was read by a friend by my side, he said: "That answer may be true, as it applies to Rev. Mr. H.; but what will you say when I tell you that I cannot sleep unless my head *is to the north* and my feet to the south?"

"Oh! that is all plain enough," said I; "Mr. H. is of delicate form, with sanguinary nervous temperament, while you are strong and muscular. He cannot bear a strong current on his brain, while you have a dark, bilious, lymphatic temperament, thick skin and dark hair; you require the excess of electricity to raise your brain to the equilibrium of quiet repose."

The gentleman said that he had slept with his head to the north for twenty years without knowing what made the difference.

In a standing position, with the feet upon the ground, a large share of magnetism passes off into the earth. The position of the head being the highest part, is favorable for receiving and retaining the fluid upon the brain. When the feet are well protected by good non-conducting clothing, as woolen socks, the escape is not so rapid. We have met with the history of some cases, where, upon woolen carpets ladies of delicate nervous temperaments have naturally accumulated electricity in such excess that sparks would be emitted upon approaching one in a negative state.

To the above may be added the following:
A few evenings ago I enjoyed a visit from Dr. Van Antwerp, a very scientific gentleman of this place. When this subject came up, he remarked that he had frequently accumulated so much electricity upon his person by simply passing a few times with a sliding motion of his feet across a room covered with a woollen carpet, that he could light a gas jet by simply pointing his finger to it.

MT. STERLING, KY.

☞Two more numbers of THE MICROCOSM will close this Volume. The Third Volume will commence August, 1883.

THE CREATION.—HARMONY BETWEEN SCIENCE AND REVELATION.

BY PROF. H. S. SCHELL, A. M.

A sound theology looks upon Nature as the handiwork of God, and while it accepts supernatural Revelation upon evidence peculiar to itself, it accepts also every established fact of the physical universe as equally of divine origin and authority; and should a seeming discrepancy occur, the Christian scientist will suspect an error of observation, induction, or interpretation, and will reserve his decision until a more advanced knowledge reconciles the apparent discrepancy.

The Bible contains the oldest written account of the creation, but the prominent thought of the book of Genesis, in which it is recorded, was not to teach science, but to exhibit God in connection with the religious and providential history of mankind.

The subject of the first chapter is the origin of the earth and its inhabitants with the visible surrounding heavens. This is one of the profoundest subjects of human thought, and has occupied the speculations of the greatest philosophers of ancient times and the investigations and theories of modern science.

The method pursued in 'Genesis' is the reverse of that adopted by physical scientists. The latter, by induction, seek after laws, principles, and causes; but Genesis begins with the great First Cause. Science leads us back, step by step, to the necessity of an original cause. Genesis sets that cause before us directly in the declaration, "In the beginning *God* created the heavens and the earth." If this account is true, it must have proceeded from God himself; as there was no human observer to record it, and the facts are beyond even human discovery at the present advanced stage of science.

At first we have a picture of *chaos*—matter in a crude, formless condition, shrouded in darkness, and the first act of the "Spirit of God" was the evolution of light. If this chaos was matter in a rarefied or gaseous state, diffused in space, molecular action or a chemical change evolving electricity may have produced the light as described; and then motion, it is probable, gave shape by degrees to the earth. Next, the earth was divided or separated from the fluid that surrounded it, and assumed a condition of solidity; next, its features began to appear in outline; then vegetable life commenced; then the mists which enveloped the earth cleared away and the light of the sun appeared; next, the lower order of animals were introduced in a successive series, and finally appeared the mammals, and then man, the crown, glory and end of the created world.

The outline sketched by science, is in remarkable correspondence with that given in Genesis, for this book gives simply, an outline. The writer does not give the processes of creation, but merely the succession of occurrences; and the object at every step seems to be to exhibit the power and wisdom of God.

The question as to whence came this sublime conception of God which has never been exceeded by any philosophy since, the materialistic scientist and the skeptical philosopher have failed to answer. Whence this wondrous, true, and ever accurate outline of the course of creation in an age of the world when there was no philosophy or science equal to such conceptions and discoveries?—in an age when all the wisdom of the world upon such matters has shown itself to be utterly and hope-

lessly in fault? Whence came this account of the creation, but from God himself, by direct communication to man, perhaps in a vision or succession of visions similar to those described by the apostle John in the Apocalypse? Moses has not attempted to teach astronomy or geology, but has laid down the first fundamental truth in all theology—a personal Creator. The existence of God, it is true, is only assumed; yet the universe here contemplated as the work of creative intelligence, becomes a convincing argument for the being and immanence of God.

Geology shows that the earliest animals and plants of the globe were wholly water species;—then followed an amphibean era in which reptiles and birds were the chief animal types, and this is in exact accord with the statement in Genesis; and as we know that vegetation was a necessary prelude to animal life, Genesis tells us that the plant kingdom was instituted before the creation of animals. How harmonious and consistent!

Science teaches that light is produced by a disturbed action of molecules, and is a result of molecular action; matter in an inactive state, without force operating upon it, would be dark, cold and dead, and the first effect of the mutual action of its molecules, would be the production of light; the command "Let there be light" was therefore, the summons to activity in matter; and here, also, Genesis is in exact accord with the teaching of science.

By proving the record true, science must pronounce it Divine; for who could correctly narrate the secrets of eternity but God himself.

Not many years ago, scientific theories respecting the creation clashed with the account given by Moses, but as more "light was evolved," the "mists that enveloped science cleared away" and "the light of the Sun appeared," the result being a perfect harmony between science and the Bible, in regard to the process of creation.

THE PROBLEM OF PHYSICAL LIFE.

BY E. E. ORVIS.

The Problem of Human Life Here and Hereafter has set thinking men to studying the whole question of physical life with a zest and earnestness never seen before. And these studies so far have resulted in no advantage to the old, but new-fangled hypothetical scientific theory now known by the name of Evolution. I design here to present briefly one phase of this grand life-problem.

No Evolutionist will call in question either of the three following propositions:

1st. There was a time in the history of this earth, when, by reason of intense heat, no physical life, or seeds, or germs of life could possibly exist thereon.

2d. The earth now teams with innumerable forms of vegetable and animal life.

3d. Every species of plants and animals possesses the power of reproduction; and no man now has the slightest knowledge of any living thing, except such as have sprung from a pre-existing life germ; nor has any man now any knowledge of the existence of any life-germs, either vegetable or animal, except such as have been produced by pre-existent vegetables or animals.

The problem is; *Whence* and *How* came physical life on this earth? It is conceded that the time was when no living thing did or could exist here; that even if either physical life, or life germs, had previously existed, they must have been totally destroyed by the intense heat of the incandescent earth. Now, all is replete with life. Whence came this life?

Clearly life must have had a *beginning* on this globe; for there was a time when it was not here. No sane man will venture to avoid this problem by alleging that the present order of things always existed, and that from all eternity living things have existed, and have reproduced their species through the medium of the life germs as at present. A *beginning*—a *genesis*—so far as physical life is concerned is inevitable.

If vegetable and animal life had a beginning, the beginning must have been either by producing the life germs of the different species of living things, which matured into the respective plants and animals as at present; or by directly producing the living plant or animal, with the present reproductive powers in full vigor. In either case it was *creative power* that was exerted, substantially a *miracle*. Was this miracle wrought, this creative power exerted, by that something we call Nature? Clearly not; for it is not the *nature* of that which has no life, nor the germ of life, to produce life. All experiments to produce life by spontaneous generation, it is admitted, have proved signal failures.

The genesis of physical life by Israel's illustrious Law giver has the merit of being clear, distinct, and intelligible: "And God said, Let the earth bring forth grass, the herb yielding seed, and the fruit tree yielding fruit after his kind, whose seed is in itself, on the earth; and it was so. And the earth brought forth grass, and the herb yielding seed after his kind, and the tree yielding fruit whose seed was in itself, after his kind,' Gen. i:11, 12. "And God said, Let the waters bring forth abundantly the moving creatures that hath life, and fowl that may fly above the earth in the open firmament of heaven. And God created great whales, and every living creature that moveth which the waters brought forth abundantly, after their kind, and every winged fowl after his kind; and God saw that it was good. And God blessed them saying, Be fruitful and multiply and fill the waters in the seas, and let fowl multiply in the earth," Verses 21, 22. "And God made the beasts of the earth after his kind, and the cattle after their kind, and every thing that creepeth upon the earth after his kind," Verse 25. "And the Lord God formed man of the dust of the ground, and breathed into his nostrils the breath of life, and man became a living soul," Gen. ii:7. "And every plant of the field before it was in the earth, and every herb of the field before it grew," Verse 5. "And God said (to man) Behold I have given you every herb bearing seed which is upon the face of the earth, and every tree in the which is the fruit of a tree yielding seed, to you it shall be for meat. And to every beast of the earth, and every fowl of the air, and to every thing that creepeth upon the earth wherein there is life, I have given every green herb for meat," Gen. i:29, 30.

There is no mistaking these utterances, in their bearing upon the question before us. Every species of vegetables and animals was created by the Lord God, each at the very first in a state of perfection, and capable of reproducing its kind. He did not first create the seed, and then grow the plant, nor make an egg, and then hatch and rear the fowl; but made "every herb of the field before it grew," and each variety of animals in a

perfectly developed state. So that on Scriptural grounds it is no problem to know which was first, the hen or the egg; but it is not so with the hypothetical genesis of evolution.

It is worthy of note that these statements of Moses, are not only inteligible and reasonable in themselves, but that there is not a fact known to the scientific world that conflicts with them in the slightest particular. If this is not the true genesis of physical life, then are we all in the dark on the subject. The theory of spontaneous generation, and natural evolution is not only unproved, but insusceptible of proof. It is simply an unsupported hypothesis.

Let Evolutionists grapple with this problem: Let them account for the existence of physical life on this earth, without admitting the pre-existence of an intelligent creative power, if they can. They have been again and again challenged to this task, and they have made various efforts in this direction, but thus far have signally failed; they themselves being judges. It is easy for them to present an imaginary hypothesis; but to furnish any evidence of its truth, is what they find it impossible to do.

They can complacently *assume* that there is some power in Nature capable of producing living organisms, or the life-germs from which they may spring. But right at the threshhold they encounter the stubborn fact, *that that which has no life cannot impart life.* Until life was produced, all Nature was dead, lifeless, and hence incapable of imparting life. The origin of life could not possibly have been the work of lifeless matter. In the physical elements of the earth, there was no life-giving power. Clearly the production of life on the earth was not the work of dead,—inanimate Nature, but must have been *super*-natural,—was the work of some power above, and more potent than, inanimate Nature. What Power was that, if not the power named by Moses?

KINGSTON, N. C.

MODERN PHILOSOPHY AND CHRISTIANITY.—No. 1.

BY JAS. W. LOWBER, M.A., Ph.D.

Ancient philosophy had two extreme tendencies —the one to an extreme realism, the other to an extreme idealism, both leading to infidelity. These extremes existed in the Ionian and Pythagorean schools, also in the schools of the Epicureans and Stoics. The disciples of Plato and Aristotle went to extremes which the masters would not at all have sanctioned. Socrates was the great mental philosopher, and really the founder of ethical philosophy. He stood upon a religious platform which towered far above the Acropolis of Athens. The Greeks had traditions which pointed back to the time when men believed in the one only living and true God. They had received their religion from the East, where monotheism was the only religion in the early history of the race. They knew God, but did not glorify Him; so they became vain in their imagination, and their foolish heart was darkened, (Romans 1:xxi.) Socrates, Plato and Aristotle obtained all the religious light that could be gotten from the Gentile world. They were really morning stars ushering in the light of a glorious day. They were schoolmasters leading the nations to Christ. In this sense, they were regarded by the Christain fathers.

The extreme materialistic and rationalistic tendencies of ancient philosophy are fearfully visible in the tendencies of modern speculation. There have been two systems in modern times, which have been productive of a vast amount of skepticism; I mean *sensationalism* and *transcendentalism.* We go to France for the development of the one, and to Germany for the development of the other.

The sensational philosophy has had a wide-spread influence, and it has been destructive to the effects of a pure religion. It was at one time the creed of the greater part of philosophical Europe. Hobbs, and not Locke, was the originator of it. "*Nihil-est intellectu quod non prius fuerit in sensu,*" was the psychology of Hobbs, and not necessarily the psychology of John Locke. Condillac perverted the philosophy of Locke, and pushed it into materialism. This was destructive to all the principles of a pure religion. Materialism prepared the way for Atheism, which denies the existence of God. This is the grossest form of infidelity. It reaches the climax. It places man without a maker in a world which had no creator. It sweeps away with one mighty stroke all hopes of the future. The desire and expectation of an eternal home, which permeate the human heart and comfort man in the hour of death, are vain delusions. If Atheism be true, it legitimately follows that man, in his destiny, has no pre-eminence over the brute; for death would be to both an eternal sleep. We see, then, to what sensationalism has led; and we may add, that it bathed France in blood.

History teaches us that idealism has had no less tendency to skepticism than its extreme sensationalism. This ideal philosophy, which has been fully developed in Germany, dates from Leibnitz. He was a bitter opponent of Lock, and a disciple of Descartes. As sensationalism has misrepresented the Lockian philosophy, so the Leibnitzian philosophy has been greatly perverted by the pretended disciples of this great philosopher. Leibnitz was one of the greatest men of modern times. There is no man more worthy of the title universal genius, than was this celebrated German. He has left his impress upon almost every science. He shares equally with Sir Isaac Newton, the glory of inventing the "Differential and Integral Calculus." His theory of Monads, in some of its phases, is admitted by the most scientific minds of the present time. His theory of Optimism, which has been beautifully versified by Pope, is strikingly contradictory to the gloomy philosophy of some recent German speculators.

Rationalism, which has long been the favorite philosophy of the Germans, seeks truth only in reason. Ideas, they maintain, are innate, and depend not upon experience. All knowledge is with them subjective. They attach no importance to the external evidences of Christianity. Hegel had a Christology, but it was the creation of his own philosophy. He believed in a God, but it was a god without personality except in the human mind. This philosophy banishes God from the universe, and unites itself with Atheism.

LANCASTER, KY.

IS MAN'S PHYSICAL NATURE AN EVOLUTION FROM THE LOWER ANIMALS?—No. V.

BY REV. JOS. S. VAN DYKE.

Another powerful reason for rejecting this theory is the absence of transitional forms. As we are not asked to believe that the ape like creature, to which man is said to owe his origin, was the immediate offspring of the simiadæ, but that there were numberless insensible gradations, it is cer-

tainly strange that no connecting links have been discovered, either among the living or the fossil dead. According to evolutionists, apes ranged over the continent of Europe as far back as the Upper Miocene period; and yet, what they are now they were then—there being no remains of improved forms. Still we are expected to believe that the gorilla went on improving for thousands upon thousands of years till at length man was born, and then forsooth the improved species died out, and all the intermediate forms disappeared, leaving only the silly monkey and his disowned children, the human family; all record of the intimate relationship between them having been effectually obliterated. Assuredly, we may count on being excused for expressing the regret that at least one fossil hand, or skull, or thigh-bone, or pelvis, belonging to a transitional form, was not preserved; but no, we have simply gorilla's bones and man's bones, no bones from intermediate links.

Great as is the improbability that there should be no record of the transition from the ape to man, the improbability is infinitely increased that all species should have varied during the long geological periods without leaving one single fossil of a transitional form, not even in situations and under conditions where almost everything seems to have been preserved. Why is there such a vast number of perfectly similar specimens of so many species of plants and animals and no graduated links; and yet in order to the gradual development of species, the number of variations must have been far greater than the number of individuals in any one variety? It seems, therefore, more probable that no two specimens preserved, would be of the same variety, than that numberless specimens of one variety should be found and absolutely none of the connecting varities. It is almost inconceivable that no record should be preserved of all the incipient stages in the development of new organs; and yet, though thirty thousand specimens of extinct animals have been collected, not one has been proved to be a transitional form, but is considered as belonging to an independent species, the few once claimed as intermediate forms having been proved to be distinct.

This objection, it has been said, though of force against evolution in general, has no force against the Darwinian hypothesis, since the absence of transitions is a consequence of his doctrine, the stock whence new species spring not being necessarily intermediate between pre-existing species, as is evident from the fact that the carrier-pigeon and the fantail came from the rock-pigeon without any intermediate links. If there is any cogency in this argument, it is a little singular that Darwin did not observe it: and if his pupils are to employ it, it is quite unfortunate that their teacher so frequently laid great stress upon the aphorism, "Natura non facit saltum." If Nature makes no jumps there certainly ought to be transitional forms.

Sir Charles Lyell (who after long resistance has become an advocate of evolution and as well of the savage theory of man's origin) undertakes in his "Antiquity of Man," to blunt the edge of this adverse criticism by reminding his readers that search, for the missing links between man and apes, has not yet been made upon the proper pages of Nature's great book. They must be sought, he says, not in miocene or eocene strata, but in pliocene and pleistocene, and equatorial regions. In these latter formations, and in the continents of Africa and Asia, investigation must be made. But he elsewhere affirms that in very remote periods Europe enjoyed a tropical climate and was inhabited by gibbons and long-armed apes and monkeys in large numbers. Why conclude that the transmutation must have taken place in regions as yet but imperfectly explored.

The links in the evolutionist's argument are thus found to be the weakest where they should have been the strongest. Darwin admits that he should have expected more evidence from geology. The only explanation he can give is to insist upon the imperfection of the geological record—a poor solution, as all must acknowledge. He even concedes that all the most eminent geologists, reasoning from this absence of intermediate forms, believe in the immutability of species. He believes, however in the mutability of species: and yet, if varieties differ from species only in degree, the successive steps ought certainly to have been chronicled in the rocks by a connected series of slightly improved individuals: if, indeed, instead of a record of the existence of distinct species, there ought not to have been clear traces of utter confusion in nature. It is true that fossils from successive formations are more closely related to each other than the fossils of two remote formations; it is also true that the tendency in recent geological researches is to adopt the theory that there has been no sudden and extensive changes, but there are gaps, nevertheless, as few presume to deny.

Though it is now quite generally conceded that the transformations which have taken place were seldom, perhaps never, sudden, complete and simultaneous; still, evidence is not wanting that they were in fact new creations. For example, the Silurian rocks contain fossils in abundance; but there are no fishes and no forms giving evidence of the capability, or even possibility, of developing fish. In the next epoch, lo, fishes are found in vast numbers, and even in perfect types. If there was an almost infinite number of gradations between mollusks and fish, why are there no deposits containing testimony to this fact? Why is the proof so strong that there may have been successive creations?

Why do the changes, which in many instances are not slight, bear evidence of having been produced by a power outside of or above the ordinary course of nature? "The evidence of geology to-day," says an eminent naturalist, "is that species seem to come in suddenly and in full perfection, remain substantially unchanged during the term of their existence, and pass away in full perfection. Other species take their place, apparently by substitution not by transmutation.

RELATION OF THE FINITE TO THE INFINITE.

BY REV. THOS. M. WALKER.

A. WILFORD HALL. *Dear Sir:*—I do not now propose to add to the many letters of commendation that you are receiving. I may, however, say that there are few that have received greater pleasure and profit than I have, in reading "*The Problem of Human Life*," and THE MICROCOSM as the numbers have come to hand. I wish, rather, to call attention to a subject that has an important bearing in questions of Philosophy and Science, and equally so in Religion, but in relation to which, among all classes, there appears to be a vagueness of conception that will certainly justify thorough discussion; and no pen is better quallified for this than yours. It is the relation that the human mind

sustains to the Infinite, or whether it sustains any, except a capacity to receive and understand the nature of facts, that belong to this department. Our minds are finite, and there is a finite field for thought and investigation, to which they are especially adapted, in which all our appliances for the acquisition of knowledge may lead to correct results. But the finite is in every direction shaded into the infinite. We can comprehend the progress of time, but following the stream we are soon lost in the infinite reach of eternity. The same is true of space. And we are thus brought face to face with the conception of an infinite God; an Intelligence whose very Being, and very attributes are as limitless as eternity or as boundless as space. What relation, then, does our minds sustain to the infinite? is certainly a question of no small importance. We have a capacity to receive a knowledge of facts that belong to this department. We know what infinite duration, or infinite extension means. We can believe in the existence of a God who is infinite, and of infinite power, wisdom or love, while we are conscious that we cannot begin to fathom the depths of these mysteries. But can we reason from the finite to the infinite? Are our minds adapted to this? Or is it not true that in all our investigations as soon as we touch the infinite we are lost, and that logic and even mathematical demonstration utterly fail us? This is illustrated in the doctrine of a trinity in the Godhead. This doctrine is believed by almost the entire Christian world. But Unitarians tell us that one cannot be three, and three cannot be one; that this doctrine is self-contradictory, and mathematically false, and hence, the sentiment of the Christian world is wrong. Now wherein is there a flaw in this reasoning? Is not the conclusion inevitable from the premises according to the laws of finite logic? Can it be set aside in any way except by authority in the plain teaching of God's word?

Again, discussions often arise as to what God can, or cannot do, consistently with the known facts of His Being or character. For example, God is infinite in power, wisdom and love; therefore He cannot inflict pain Himself or suffer it to be inflicted on any being capable of suffering. Can anything by logical deduction or even mathematical demonstration be made more sure than this conclusion from the premises? It can be, and is only set aside by facts of which we are all painful witnesses.

Or again, from the infinite power of God the conclusion is logically drawn that He can limit the exercise of His own attributes; that thus He can foreknow or not foreknow future events at His pleasure. But is there not a question dimly seen that lies behind this that likewise has its base in the infinite that might vitiate this logic? Is there a past, present and future to the Infinite God whose name is *I am?* We may guess that there is; because there is a past, present and future to us, and we cannot conceive how it can be otherwise. But is this satisfactory? Would it not be silly, but of like reasoning if, in view of God's omnipresence, we should ask, where is His centre? Where His circumference? Where His head, etc.? Would we answer, as I have sometimes heard it answered, His centre is everywhere and His circumference nowhere? On the contrary, is it not true that God is everywhere present at the same time in all the perfectness of His being? I know that human logic may say that this is an infinite absurdity, and I know that you suggest a somewhat different theory. But here is the question. Shall we apply the rule of finite logic to the infinite? Are not these two deparments, though shading into each other, as distinct as matter is from mind?

I will suggest another point, and one that touches a theory of your own; but perhaps none the worse for that, as it is not essential in the great work that you have accomplished in "*The Problem of Human Life.*" You take the position usually taken by Philosophers and Scientists that "Nothing from Nothing comes," that even God's omnipotence cannot create something out of nothing, and as a corollary, no thing can be anihilated. Then you propose to find the origin of matter, and all other substances in the Divine essence. This is, perhaps, the most plausible theory that can be formulated, creation from nothing being rejected; otherwise matter, for example, is either eternal or self-created, which in some respects would make it equal to, and independent of, God Himself. But nevertheless, this theory is, I think, exceedingly objectionable, principally for two reasons, aside from its being simply a theory with the apology that it is the best that can be formulated.

1st. It is open to the charge of Pantheism. I know that you labor to show otherwise, and you relieve it from the grosser conception of the Pantheist. But how is it when I look upon a marble statue, and realize that a little while ago all that formed that image was a part of the essence of God, taken out of His substance and compressed into marble; or that the mind that chatters in the body of a monkey was a little while ago a part of the inteligence of God, and in a little while will be returned to the source from whence it came? How can I avoid looking on these things as, in an important sense, Divine?

2d. The theory is, I think, repulsive to a devout mind. If true, it follows that what has been a part of the Infinitely Pure and Holy God, has become corrupt and is condemned to eternal pollution and death. The body and soul of Judus Iscariot were at one time a part of the Divine Essence, as were the soul and body of the Lord Jesus. This, I think more than anything else, has made the Christian world slow in giving a ready and hearty indorsement to the noblest defense of Christianity against materiaism and evolution that has appeared in modern times. But is there a necessity for throwing aside as unworthy of belief, the old Catechism that says, "The work of creation is God's making all things out of nothing by the word of His power?" You reject this on the same ground that the Unitarian rejects the Divinity of Christ. But are you not reasoning in the dark, measuring the infinite by the finite? Are not all your premises unknown quantities, belonging to the infinite? At all events would it not be well to wait until science tells us what matter, for example, is, and then we will be better prepared to discuss its origin? We are told that one of the essential attributes, if not *the* essential attribute, of matter is extension and consequent divisibility. Then trace matter in this line to its lowest element, and what have you? If it is matter it is still divisible and you have not reached the lowest element. But our minds are finite and we cannot reach the infinite divisibility of matter. This is true, but the infinite mind of God can. What then does God find as the ultimate? If it is matter it is still divisible beyond the infinite, which is absurd; and if it is not divisible it is not matter, and if not matter what logic will hinder us from saying it is nothing, and that God created all things out of nothing by the word of His power? There is no escape by saying that matter was created from mind, for if mind is

divisible, of which we know nothing, traced in the same way, its ultimate is nothing; and if not divisible, it will certainly avail no more in building up a world than nothing. And, aside from this, is it not as impossible and as unscientific to postulate the creation of matter out of mind as out of nothing?

And is not creation from nothing the theory that leaves God master of the Universe, able to create and destroy at His pleasure?

What I have written is intended to invite you to give this subject your personal consideration in THE MICROCOSM. Thorough discussion, I think, would do much to clear away the mist that now darkens much of our Philosophy.

Yours in the highest esteem, T. M. W.
FOUNTAIN GREEN, ILL.

REMARKS ON THE FOREGOING.

We really are forced to confess that Mr. Walker has succeeded in getting the problem of creating something out of nothing about as badly tangled up as we have ever seen it. Indeed, we do not know how it could be more inextricably complicated. At first, on reading his involvement of difficulty upon difficulty, we were inclined to give it up and say Yes; God did create the universe out of *nothing* or out of something else of about the same density, and no part of Himself. It does not look, we admit, quite the nice thing to say that Judas Iscariot, with all his meaness and treachery, was primordially a fraction of the Almighty; or that God would be doing a consistent thing to punish a part of Himself. The monkey, too, being originally a part of God's essential being, might be construed by Beecher and other theistic evolutionists, into an apology for their Darwinian summersault from the book of *Genesis* to the *Origin of Species*. But on recovering our equilibrium, after the shock of a first reading, we ask ourself the question: What is the difference, after all, as to the practical result, whether God made a *cobra de capello* (the meanest and most venomous snake that crawls) out of nothing at all, or out of a fraction of His own exterior nature, such, for example, as the substantial force of electricity or gravitation, which, as we have shown, must be a something—an entity—beyond all manner of question? If He made the *cobra* out of nothing, then it depended entirely upon God for its existence, and for its venom, as much as if the Deity had made it out of a part of His own infinite substance. The *cobra* cannot shield the Creator from some sort of remote identity with its snakeship by pointing to *nothing*, out of which it was made, since this *nothing* depended exclusively upon God's choice and fiat for being changed into the seed of the serpent that should bite the woman as well as into the seed of the woman that should bruise the serpent's head. In what would it save the Deity from being the real source of the original *cobra* by His making it out of nothing, rather than first changing this *nothing* into something as a remote exterior fraction of His own substantial being, and then making this animal out of such substance? If there would be no essential difference as to the idea or degree of Divine degradation in the two modes of making a *cobra*, then is it not an economy of imaginative effort to assume at once that all the substance or possibility of substance in the universe (including this "nothing" out of which substance was creatable) was originally monopolized by the infinite Creator as a part of His own being—not of His *infinite personality*, but of His exterior nature—and thus give Him credit for all things and all possibility of things direct or indirect as from Himself?

It seems to us the climax of absurdity, and a muddle of self-contradiction, to suppose that God could create *something* out of *nothing*, unless we first admit that this *nothing*, out of which He created *something* was already *something* capable of being converted into another *something* under the action of infinite wisdom and power. That is to say, *no something* and *some nothing* were the same, and this *nothing* possesses such inherent characteristics and existed in such quantities (think of the absurd contradiction!) that God was enabled to take *some* of this *nothing* and make *something* out of it, and that there was *nothing* to prevent His doing so, as He possesses infinite power! This proves that *nothing* is really at the same time *something*, and *vice versa*, or else God could not take some of this *nothing* and make *something* out of it. Thus we have the flattest self-contradiction possible in human speech, formulated into an article of Christian faith in our Catechism. To suppose that an inconceivable act would be possible with God because He is infinite, and that we should not object to its possibility because we are finite, and because our finite minds are not supposed to be capable of grasping the range and power of infinity, is to stop our thinking or trying to think about God in any degree. How in the name of reason are we to believe, as an article of faith, the possibility of an act of God's infinity so much beyond the grasp of finite conception? Better, by far, that we have one general article of faith stating broadly that we, as finite creatures, know nothing at all about the infinite God or how or out of what He created the universe, than to state definitely, as an article of faith for finite minds to accept, that He actually made all things out of *nothing*, while at the same time contending that, as finite beings, we know *nothing* about this potential *nothing*, nor about the infinite process by which an infinite God converted it into something.

If it is possible for God to work all contradictions, however absurd they may seem to finite minds, then it puts an abrupt end to our attempts even to conceive of the existence of such a being. To say because God is infinite that He could, for example, *put an end to duration*, or *set a limit to space* so that there would be no extension of dis-

tance beyond a certain boundary-line He might fix, would be assuming the possibility of His performing just such an absurd contradiction in terms as that of His ability to make something out of nothing.

Would not our own view, as assumed in the *Problem*, difficult as it may seem, better maintain the dignity and pre-eminence of the Divine character and attributes as the *All in all*, than to try to shield Him from indignity by supposing such an impossibility as a creation of the material universe out of nothing? Does not this assumption make *nothing* a connecting-link between God and all the mean and detestable things that have ever been made? And how would it be worse for God's infinitely pure and glorified character to have this connecting-link a fraction of His exterior but real being?

We fail to see how this nothing-factor helps Deity in asserting His infinite superiority over matter as His co-eternal competitor in actual existence. If this essential "nothing" was of such a potentially entitative character as to be capable of being manufactured into material worlds, we fail to see why such intrinsically substantial nothingness was not as much an undignified competitor of the Almighty as would have been a universe full of uncreated nebulous star-dust, co-existing with Deity from all eternity. If God could really change such *nothing* into *something*, out of which then to make a world, He could also change this same "nothing" into an additional remote part of Himself, and use this same extra substance thus created to make worlds of as well as to make them directly out of the original nothing. And as there is no end to the extent of this *nothing*, and no limit to such infinite capability, God could, for aught we can imagine, change a sufficient quantity of *nothing* into a substantial extension of His own exterior being out of which to create this entire material universe, and millions of others as large. If *nothing* is really susceptible of being thus made into a cobra, or a monkey, or a world, for example, we fail to see wherein this uncreated, self-existent, co-eternal *nothing* differs from *matter* itself as a co-eternal, uncreated competitor of the Almighty; or wherein even an uncreated cobra itself might not have existed from all eternity, without detracting from divine dignity any more than would this uncreated, potentially material *nothing*, out of which the cobra was made. Plainly, if we believed in the possibility of creating something out of nothing, and wished to vindicate the character of Deity as the only independent self-existence of the universe, without the possibility of co-eternal competition, we would surely assume that He first used up every particle of *nothing* capable of being thus changed into *something*, by which to add to the extension of His own essential and substantial being, out of which then to manufacture worlds and their inhabitants, as required. Manifestly, no detraction from God's dignity or perfection would thus result, even from creating the most repulsive reptile any more than would result from its creation directly out of nothing alone by Divine fiat; while all competition from this semi-material *nothing* would be avoided. But as we have never been able to grasp the conception of the creation of something out of nothing, regarding it as a self-evident contradiction in terms, we have naturally preferred the more rational and less complex method of thinking, and have supposed that all the primordial substance of the universe capable of becoming matter, and before any act of creation had taken place, was really embraced in God's *exterior nature*, as we have been forced to term it, in order to harmonize our conception of God as a Being with Spirit and body, analogous to man who was made in His image. We do not see how any enlightened Christian man can take exception to this view, or suppose for a moment that it degrades the perfections of God to the Pantheistic level of a total denial of a personal or intelligent Deity, and which makes the physical universe either eternally self-existent or the unintelligent creator of itself. Hence, we think the least said about this "nothing" as a manufacturing material, the better; and that the more firmly we can plant ourselves upon the everlasting rock of believing God to be the primordial source and fountain from which all things have emanated, including this potential "nothing," if there be such a thing, the sooner will we be able to solve all the minor mysteries of the universe by sinking them into the one infinite mystery which no man, by searching, will ever find out.

ESSENTIAL ORDER OF CREATION.

BY REV. S. A. TAFT, D. D.

In the creation of Adam, did God begin with the material, "the dust of the ground," and end with the immaterial, Himself? Or did He begin with the immaterial, Himself, and end with the material, "the dust of the ground?" In other words, did God first make the body of Adam, and then "infuse" or breathe into it, if you will, through the medium of the nostrils, the living substantial organism? Or did He begin with the incorporeal, subtantial organism, the real essential man, and end with the body, his vestment or covering?

I claim the latter; and I do this for two reasons. (1) Because, in general, in creation, God begins with Himself. He first gives forth the immaterial; and then, if so designed or intended, He clothes or invests it with the material. This is the divine order. It could not well be otherwise; for something could never come of nothing.

Two things are eternal, something, and somebody. Nor are these to be distinguished as matter and mind; for matter, as matter, is not eternal. It is finite and limited. It had a beginning, and it may have an ending. God alone is eternal.

But He is both something and somebody. He is substance, as well as person. He is life, as well as

mind; for He is living, as well as thinking. He is body, life, mind, soul, and spirit. Nor do these several parts, so to speak, of Deity, differ in fundamental essence, or substance; but simply in the degree of their "attenuation" or "condensation." They are all of one substance, but not all of the same tenuity. The life of God is more attenuated than the body of God; the mind, than the life; the soul, than the mind; the spirit, than the soul; but each is more attenuated than we can conceive.

The body of God compasses God. It is, so to speak, His exterior, the lowest "elemental essence," in the divine nature. And from this, as I conceive, by a process of elimination and condensation, comes what we call matter. From the life of God comes life; from the mind of God comes mind; and so on through to the divine spirit. God is Himself immaterial; that is, He is not physically tangible. He is nevertheless, substantial, real, positive, and actual. And out of Him are all things, as says the apostle, "All things are out of God." He is Himself, or in some part of Himself, the foundation, the basic element of all that exists beside Himself.

And so, in general, in creation, God begun with Himself. He first uses some part of His own infinite substance, and with this lays the foundation of whatever He would create. This is the uniform rule. And hence it is that everything roots itself in the immaterial. The immaterial, in some aspects of itself at least is eternal. The material is a thing of to-day. And thus it is, that the heavens and the earth were, and all things that are therein. Everything is tied up to God.

From this point of view, then, I claim that in the creation of Adam, as of all things else, God begun with Himself, and not, as is so generally claimed, with something He had already created.

And, if the reader will allow any reference to the how of all this, I would say, (*a*) by the elimination of certain "infinitesimal atoms" from God's own "vitality and intelligence;" (*b*) by the combination and organization of these into an organism of the form and nature we see expressed in man, and the embodiment of the same in a life germ, or cell; (*c*) by the deposition of this cell in such juxtaposition and relationship to material forms, such as albumen, protoplasm, etc., as to render it possible for the organism by the operation and work of its own myriad bioplasts, to cover and conceal itself, not as a whole simply, but in every part and particular, internal and external, in a material vestment; (*d*) and then by the sudden and instantaneous swelling of all the atoms, both corporeal and incorporeal, causing it to spring forth into a fully developed man: and finally (*e*) by causing him to breathe, as indicated in the words, "And He (God) breathed into his nostrils the breath of life (lives), and the man became a living soul." All this text teaches is, that God caused Adam to breathe; just that and nothing more.

Thus it was, as I conceive, that Adam was made. There was first the immaterial organism; second, its vestment, or covering; third, its sudden full and complete development; and fourth, giving it breath, or causing it to breathe.

(2). My second argument in confirmation of this being the mode and order of Adam's creation lies in the fact that all his posterity now, and from the first, begin their existences on the same general plan. There is first the incorporeal, immaterial organism; and then secondly its investment, and development. Nowhere, in all Nature, do the young of any species begin existence with the body. Then why should their original, foundation sires have done so? They did not; but they began being on the general principle noted above. True, there is a difference; but that difference is not fundamental, except in two particulars—the source of derivation, and the circumstances of development. Adam was derived directly from God. He was purely of Divine origin. God made him. And he was, in no way, dependent upon any other person, place, or thing, for his existence. Not so, however, with his posterity. They are all, with one single exception, humanly generated, or begotten.

And this means, (*a*) that, somehow, they are all derived from one another; and then (*b*) that they are developed, in part, at least, in and through *conceivers* who are of the same species and blood with the begetters. In these two particulars, lies the great distinctive difference between the origin and development of Adam, and that of any one of his posterity. Nevertheless, they all begin being in the immaterial, and not the material.

All will concede that life begins in a "life-germ" or cell. But in that life-germ, there is "a vital and mental entity," and organism, perfect and complete, corresponding, in every part and particular, to the organism of the species, whence was the germ, and which is to be developed. Either this is so, or it is not. And, if not so, how are you going to account for every species begetting its own kind, and only its own kind. An instance has never yet been known of a cross between essentially different species. And, if there is any uncertainty about this matter, "how shall it be known what is piped or harped?" Manifestly it could not be; and begetting would be a wholly uncertain thing. But there is no uncertainty about it. No fact is more fully established, than is the one fact, that God has given to every seed its own distinctive nature; and there it must and will remain.

But in what does that distinctive nature consist? Certainly not in difference of substance; for all essential substance is the same. There is but one primordial substance in the universe, and that is the divine substance.* All else is but a modification of this. At least, no one has ever yet been able to give a satisfactory "basic distinction" between this or that. We conclude, therefore, that no such basic distinction exists; and that, fundamentally, all things are out of one and the same substance. Substantially and primally speaking there is no such distinction as matter and mind. It is a distinction or difference in phenomena or manifestation only. But difference of phenomona does not argue fundamental or basic distinction in substance as a primal entity, but simply difference in the modification of substance as more or less tangible or intangible to the physical sense of man. We have this beautifully illustrated in the instance of steam and water. Steam is more attenuated than water, but all the same substantially. The phenomena, manifested by each, however, are strikingly dissimilar. And so of other things.

The question then recurs. In what does that distinctive nature in animals and vegetables consist? I answer, in *organism*; just that and nothing else. The peculiarities of organism constitute the grand distinctive difference in all seeds. God has made one after this type, and another after that; and it is this typal distinction or difference in organism that constitutes the almost endless range in species. The difference does not lie in the form

* See Second and Third chapters of the *Problem of Human Life*.

and contour of the body simply, nor in the almost illimitable varieties of flesh in the various animals, but in organism alone. The body is not itself an organism. It is but the expression of the organism embodied, so much and no more. It has no functions and powers of its own, but is wholly subservient to the organism within. It is its grand instrumentality for the execution of its own purposes and work. It differs from the armature to which it is frequently likened, and from the wire that is the medium of the electric current, in that they are solids, and in no way assimilated to the electricity they contain, but are purely artificial things, and simply accommodating; while the body is thus assimilated to the organism within, and itself made living by virtue of the organism's own life-force. This is why it takes the precise form of the incorporeal organism, and is wholly subservient to all the uses, functions and powers of such organism. It thus becomes a perfect and complete medium of manifestation, and the organism has no occasion to go outside of the body for the accomplishment of any of its manifold purposes, but can take the body with it, make it the instrumentality, and use it in the execution of whatever it wills.

From all this, we see that in the living world organism is the great essential thing. This given, and all else, essential and necessary, comes as a matter of course. This it is that builds up, gives shape, and form, and animation to the body. And is it reasonable, I ask, to suppose, that in the creation of Adam, God began with the less important part of this most wonderful specimen of divine handiwork? And most of all was it likely that He should have begun with just that part He really had no need to begin with? For, given the organism, the essential man, and the material duly prepared and at hand, the organism can and does construct and build up for itself its own material exterior. It does this to-day, in the instance of Adam's posterity, and of all living things. It has done this, in all the history of the past; and will continue to do so, unless there is a reversal or suspension of the law: for organism works under law, and that by divine ordination. Then why may it not have done this in the instance of the original of each species? I claim that it did; and hence my point in respect to the first man Adam.

This, I repeat, must have been the Divine order. And it may be safely laid down as a fundamental law—*Organism first*, and then whatever is essential and necessary to its development and manifestation.

SANTA ROSA, CAL.

THE NEW-CHURCH LIFE,

of Philadelphia, for April, refers to the March MICROCOSM, and our first reply to Prof. French's review on the sound-departure. The editor thinks our reply undignified, but says Prof. French brought it on himself "as his *critique* was seriously lacking in that dignity and repose which are generally supposed to be necessary characteristics of a Quarterly." He thinks the "most *noticeable* thing" about our reply was the denial of being a reader of Swedenborg when the "*Problem*" was written. He is mistaken. The "most *noticeable* thing" in our answer was the demonstration from Prof. French's criticism that he himself had shattered the wave-theory. This demonstration was, no doubt, the "undignified" feature of our article. We apologize to the *New-Church Life*, but we could not avoid it.

WHAT IS HELMHOLTZ DOING?

It is hinted by one of our contributors, who claims to know, that Helmholtz is now engaged in the investigation of sound-phenomena from the new standpoint suggested to his mind by *The Problem of Human Life*, sent to him about three years ago. His silence on the sound question, without one word having appeared in the press from his pen during all this time, it is claimed is a corroboration of this statement and that the public may expect soon to see the announcement in the English and German press of a new work on sound by this greatest living physicist in which the wave-theory will be entirely repudiated and abandoned, and the substantial view formularized mathematically as the only possible explanation of observed phenomena. We are not surprised at this suggestion, and have ourself thought it very strange that so profound an investigator, who had so long been misled by a theory, should not try to achieve a species of revenge by a bold *coup d' etat* to reap a part at least of the glory of the acoustical revolution now impending over the scientific world, and before the entire harvest shall have been garnered by lesser lights. The only barrier to such a hope has been the fact of self-pride, caused by his voluminous writings on acoustical science, all of which of course were in elucidation of the wave-theory, since there has never been any thing but that suggested to his mind before. But naturally we might suppose that an investigator so broad of grasp and original of conception would require only a hint concerning this new departure before its merits would be analyzed and its advantages, if any, over a manifestly defective theory, would be intelligently appreciated. Hence we are not surprised to learn that this new analysis of the science of acoustics is now in course of preparation, and that it is really the cause of so long a silence on the part of this greatest living investigator of physical phenomena.

For one we welcome his new book, when it shall come; and only now remark that he must hurry it out or many of its most telling results will have been anticipated by other investigators who are already absorbed in the same field of investigation, and who, though of less renown, are not a whit less industrious or ambitious for a place in the future of this great question. We could call names, but will not. We are ready for all the aid and succor to *Substantialism* that may come from Helmholtz and others down to the most modest worker in a college laboratory. We are only sorry that our own Prof. Mayer should indifferently or stubbornly hang back and thus abandon this acoustical opportunity to others at the very time when the *Substantail* harvest is white and ready for his sickle.

THE REFORMED MESSENGER.

Several Reformed ministers have called our attention to an article in the *Messenger* of Philadelphia, severely criticising our editorial on Prayer cure in the Feb. number of THE MICROCOSM. We have been requested to copy the criticism and reply to it. This we will probably do next month, as the present number is more than full and many articles crowded out. We will only say that the *Messenger* article is from the pen of the same editorial member of the staff who signs himself "K," and whose trouble about "sound in a vacuum" was once on a time replied to in this magazine.

IMPORTANT PAPERS LEFT OVER.

A number of most valuable contributions on various themes are unavoidably crowded over till next month. Among these are Rev. Dr. Roberts, on "Laws of Mind," No. 3; Rev. Prof. Wood, on "How Planets were Formed;" Rev. T. Williston, on the "Foreknowledge of God;" Dr. Taylor on "Unchanged Quantity of Being;" Rev. Dr. Marshall's "Open Letter to an Infidel," Capt. Carter's terrific "Exposure of Slade the Spiritualist," and several other articles that will appear in the June number, including important papers of our own.

One of our subscribers writes us that the endless torrent of religio-philosophical and scientific literature pouring through the columns of THE MICROCOSM, month after month, from the pens of our exhaustless contributors, reminds him of the story of the man standing by the River Po, waiting for the water to run by so he could cross over! He happened to be from the mountain slope of the interior where rivulets, swollen by transcient showers, would soon dry up and allow the traveller to cross over dry shod. So, says our correspondent; he had been used to reading papers that gave an occasional spurt of profound philosophical thought; but he had never before come to the banks of a literary and philosophical "*Po*" whose current was constituted of an endless torrent of religio-scientific and philosophical reasoning, swelling more and more, month after month, till the very levees and dikes of the cover seemed in danger of giving way. We are glad to have the management of these levees and dikes, and shall endeavor to protect our patrons against the dangers of a disastrous flood.

AN EXTRAORDINARY OFFER.

Any person who will send us the names of *two new subscribers* for the present volume of THE MICROCOSM *from the commencement*, with the money ($2), will receive credit for the next volume as a premium. Persons sending names under this offer should intimate it, that due credits may be given. A few minutes' effort, by almost any subscriber, among his friends, could accomplish this result; and, of course, the sooner the effort is made the easier the names can be secured. A pastor, especially, who wishes THE MICROCOSM to be read by his people, could, with a few words, induce a couple of the thinking members of his congregation to take it. Who will start out, on reading this offer, and thus secure the next volume free while aiding the spread of useful reading matter? Remit money in post-office orders or bank drafts on New York, when convenient, as an absolutely safe way. If this is not convenient, send in registered letters. Address, Hall & Co., Publishers, 23 Park Row, New York.

ISAAC HOFFER'S PAPERS.

Let every reader carefully peruse and study these two elegant productions in this and the last preceding numbers of THE MICROCOSM. For profound, analytical, and consecutive thought nothing superior, in our judgment, appears anywhere in print. We are glad to number this able writer among our regular contributors.

OUR CONTRIBUTORS.

We are proud of our contributors, and of the able and beautiful papers they are furnishing for the present volume of THE MICROCOSM, which will aggregate more than 200 for the year. Our subscribers generally entertain similar feelings of grateful pride for the magnificent array of writers whom this magazine has so suddenly and unaccountably concentrated upon its pages, very few of whom had before been heard from as writers in public journals. This shows that there are finer pearls hidden in the depths of ocean, and richer diamonds buried in undeveloped mines, than have yet been brought to the surface. We have already made many of these splendid finds, but we do not think the half has yet been presented to our readers. Next volume, we have no doubt, will bring to light still richer gems than any yet seen in its pages. We will state, as one of the secrets of this ceaseless flow of intense and original thought, that not one contribution has been the mental product of a hireling. No article has been paid for so far, for two reasons; 1, THE MICROCOSM has not been able to pay; and 2, No contributor has asked for it! Those who write for this magazine do so for the love of writing and for the good they feel they are doing; and we firmly believe that no man, who thinks of money as a part of the consideration, could ever pen such articles as appear from month to month in this journal. This may seem like boasting, but we are proud to be able thus to boast.

PROF. McBEATH ON KEPLER.

Some time ago we received an article from Prof. T. F. McBeath, A.B., criticising Kepler's Third Law. It was highly mathematical, with diagram, and for purposes of consultation we sent it to Capt. Carter, our old reliable contributor of Pennsylvania Military Academy, asking his opinion. He responds:

"It is remarkable. Print it by all means. It will prove a bomb-shell in the Camp, or I am no prophet."

We will furnish the paper to our readers next month, and will ask all mathematicians to examine it. If Kepler's laws shall follow Newton's central principle of gravity, quoted by Capt. Carter and Prof. McBeath in the March MICROCOSM, which the Captain admits, has broken down, there will be a genuine rattling among the dry bones of astronomical science.

THE GROWTH OF SUBSTANTIALISM.

We cannot help feeling a degree of gratification at the manner in which the essential features of *Substantialism* as taught in the *Problem of Human Life* are taking root in the minds of various writers and thinkers, who a few years ago would never have thought of taking such radical grounds. Now it is quite common to notice such phraseology as "vital and mental organism," "incorporeal entity," etc., in journals of the various religious denominations. In this very number of THE MICROCOSM about one-half the contributions printed from the pens of able writers are more or less based philosophically upon this fundamental and satisfying view of man's dual nature. We are glad to see the work go on, and thus show to the skeptical world a substantial and real basis for the hope that is in us of a future life.

WILFORD'S MICROCOSM.

23 Park Row, New York, May, 1883.

A. WILFORD HALL, Ph.D., Editor and Prop'r.

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SPECIAL NOTICE.

In our conduct of this journal we desire to give our list of excellent contributors the widest possible latitude for the conveyance of their honest convictions, so long, at least, as this liberty does not conflict with the general aim and scope of THE MICROCOSM. But we wish our readers definitely to understand that we do not hold ourself responsible for the views of our contributors, nor, in fact, even for our own views, as we are liable at any time to change ground on receiving more light, as we have done more than once since this paper was commenced. But, generally, we hope and aim to be consistent. EDITOR.

THE TRUE CAUSE OF EARTHQUAKES.

(PROF. SCHELL'S LETTER.)

A. WILFORD HALL, PH. D.,

Dear Sir:—Can you throw any light upon the True Cause of Earthquakes? *The scientific world* is greatly in the dark upon this occult problem, and as you have shown the courage to attack and unsettle so many questions of physical science considered well established, it occured to me that you were the man to settle these mysterious phenomena which just now are playing so much havoc with the earth's crust. Yours, Very Truly,

H. S. SCHELL,

NEW YORK, April 10th, 1883.

In response to the above we cheerfully undertake the solution suggested, with a hope of presenting an explanation of the cause of earthquakes that shall be not only new but entirely satisfactory to the average thinker upon such matters.

Boast as we may, and justly too, of the achievements of modern science in unraveling the mysterious phenomena of Nature, we are forced to confess that we have in the true cause of earthquakes an enigma which up to the present time has not been explained to any degree of satisfaction.

To show the feeling upon this question and the intense desire in the minds of scientific men to arrive at some rational conclusion on the subject, it need only be said that more than one hundred books and treatises of considerable size have been published especially devoted to these mysterious and frightful phenomena, while millions of dollars, all told, have been expended in the prosecution of observations and investigations bearing on this difficult problem, without having suggested a solution worthy the name of an explanation.

Hopeless, therefore, as the task may seem, we ask the indulgence of the reader for two or three pages of their valuable space, while we attempt, even in the face of such uncertainty, the solution so long desired?

In premising an explanation we are forced to assume as true the most plausible of the various geologic hypotheses with reference to the structure of the earth's crust, as well as of its deeper interior formation; that is that the mass of the earth is in the process of gradually cooling, and that this solid crust by such process is slowly becoming thicker, while the interior of molten lava is contracting in like proportion to lesser limits. This view is based upon the rational assumption that the earth at a remote epoch in its geologic history was a liquid, molten globe, and that as the cooling process must necessarily have begun and progressed by exterior radiation, the interior would not only remain molten after a crust had thus formed, but the central portion of the earth would naturally be the last part to cool. This must be so, or whence come the rivers of molten lava at volcanic eruptions?

This view is also the only rational explanation of

the present existence of our vast mountain chains which must have been upheaved and crushed outward when the earth's crust was very much thinner than at present. It is plain to see that the shrinkage of such a thin shell in closing up around the molten globe, would tend to crush it at its weaker places, causing lines of ridges to project in different directions and at various heights, throwing up the strata of rock which before the upheaval must have lain horizontal, making them now hang at various pitches, and at some places in just such confused angles of pitch as we now observe and as can only be explained by the very crushing and upheaving process here suggested. This would also explain the present existence of ocean shells, found thousands of feet above the ocean's level, that were once of course at the bottom of the sea. But the crust of the earth has at last grown so much thicker by cooling that this crushing process by shrinkage is at an end, and hence no more mountain chains can thus be formed. The shrinkage now must take place in the liquid center, thus causing it to fall away from the solid crust as the cooling process goes on, leaving space between the crust and the molten globe.

Our proposed solution of earthquakes will also clearly explain how volcanic eruptions occur, should this well-based assumption of the earth's crust and its interior molten state be granted, and which seems to be the only theory at all consonant with the facts just stated. We are now, by this prelude, prepared for our explanation.

As the crust of the earth becomes thicker by continually cooling, the molten interior mass, as just suggested, must necessarily fall away from its inner surface, at least in places, leaving vacant spaces filled only with vapors and gases arising from the molten interior. This shrinking or falling away of the molten globe results from the solidity of the crust preventing the lessening of its diameter by the crushings just explained. Hence, the open spaces existing between ocean and crust grow larger.

But in the process of cooling, portions or projecting masses of the interior surface of the crust must also cool and shrink irregularly, forming cracks and fissures in various directions around them, till it comes to pass that a mass of earth, possibly of millions of tons, has so shrunken and cracked itself loose from the main crust around it that it finally detaches itself and falls perhaps hundreds of feet into the molten ocean below. The breaking loose of such a mass of earth beneath our feet, even, though the intervening crust may be ten miles thick, would cause a reaction to occur in this somewhat elastic and tensioned shell by the sudden letting go of such an enormous weight, the result of which would necessarily be just what is felt in an earthquake, namely, a severe shock directly over the dislodged mass, and an undulatory movement of the ground in all directions from it, something as a boat is rocked by gentle undulations after a stone is thrown into the water near it. These ground-swells are generally felt and described as passing from some central point, sometimes in one direction and sometimes in another, just as the observer happens to be located in relation to such centre of disturbance, namely, the point directly over the mass breaking loose and causing the shock. Of course such central point would necessarily feel the severest portion of the tremor or jar, and the undulations, like all wave-motions, would become less and less violent or sensible the farther they receded from the centre of the disturbance till no movement would be felt. What confirms this view of the cause of earthquakes, among various other things to be named, is the fact that the undulatory movement following a single shock lasts almost uniformly a few seconds (a little more or less as the shock is severe or slight), or just about what might be expected as the vibrations from a single tremendous thrum of such a vast spring-board as the earth's tensioned crust. Sometimes several primary shocks, with their systems of undulatory movements, rapidly succeed each other, which are naturally explained by the fact that the jar of one such mass breaking away causes another adjacent mass to fall, and thus a succession of such loose masses becomes detached one after another by the general jar, thereby keeping up a succession of primary shocks and their secondary systems of undulations for some minutes. But there is no record that these rapidly succeeding primary shocks ever occur exactly at one point (except at volcanic eruptions), but are scattered around near a common centre just as they should be according to this theory.

If our view as to the real cause of earthquakes be correct, it is plain that such a loose mass of the earth's crust may now, at this very time, be gradually cracking around its edges preparing to fall directly under the centre of New York city which, as soon as the connection with the main crust is sufficiently weakened, will break loose and thus let the crust spring upward as the millions of tons of solid earth drop into the liquid ocean below. The result, if a large mass were thus dislodged, would be a fearful earthquake with its more destructive effects in the heart of the city, while its undulatory effects, less and less violent, would pass off and the vibratory motion would die out in the distance miles away from the city in all directions.

On the same view it is evident that many of these masses of earth, too small to produce a sensible effect as an earthquake, are cracking loose all the time beneath the surface at various localities, each of which would be recognized by means of a seismograph if sufficiently sensitive; and as no

two of such dislodged masses can be exactly of the same weight, it precisely accounts for the fact that no two earthquake shocks are of the same force, as the most careful observations show. This constant dropping away of the earth's inner crust tends to thicken or stiffen the surface of the molten sea, giving it a paste-like consistency; and this being constantly washed up against the inner crust by the daily tides caused by the reciprocal attraction of the moon and the interior molten globe, the crust of the earth thereby must grow in thickness by the adherence of this paste-like lava as it cools and sets.

In further confirmation of this view of the cause of earthquakes, the sounds accompanying them are just such as would be expected by the action here supposed; first, a deadened crash like the tearing loose of such an interior mass of earth, followed by a rumbling, continuous roar of less and less intensity during a few seconds till the vibrations of the crust naturally cease. This is the precise description that has been given by ear-witnesses of very destructive earthquakes. Also the cracking open of the earth's surface, so often occuring directly over the centre of disturbance, is only explicable by the action here described—the rebounding of the crust upward as the weight lets go, causing a rupture of the hard surface.

On the view here taken it is reasonable to suppose that such masses in various stages of cracking loose by cooling, are undoubtedly now forming in hundreds of localities beneath the earth's surface, requiring, in many instances, but a slightly unusual jar of the ground to cause the final disintegration that would be sufficient to let the mass drop. Hence, how often recently we have read reports of earthquake-shocks being felt immediately after the fall of an immense meteorite! The slight comparative jar which such a swiftly falling body would cause to the earth's crust, happening directly over such a mass almost ready to drop, might be sufficient to break its final thread of connection. How else can such singular coincidences be accounted for?

Another coincidence, which this solution fully and beautifully explains, will now be stated. It is well observed that, often when an earthquake occurs in one part of the earth other shocks will take place at a distance. These phenomena seem to have a contagious effect, even upon far-distant regions, sometimes thousands of miles away from the primary shock. This is explained by the enormous billows of the molten ocean which must roll away from the displacement such a mass would cause by falling into it. A wave of this size would travel at immense speed through the open channels, and a thousand miles away might strike with its crest a projecting mass of the inner crust almost cracked loose from its mooring, and thus cause it also to fall, by which another shock or series of shocks will be felt, as so often reported by telegraph, within a few hours of each other even on almost opposite sides of the earth.

This solution also explains most satisfactorily the great sea-waves so often witnessed along the ocean coast which flow in upon the land from unknown distances with destructive effects upon shipping, and even cities built near the ocean's edge. As the crust of the solid earth is necessarily thinner beneath the deep sea, the dislodgement of one of these interior masses would generate a greater upward rebound of the crust as it lets go than where the entire thickness of crust is composed of solid earth. Such rebound would cause the sudden projection of the ocean surface directly over the dislodged mass, lifting it considerably above its normal level, the result of which could be nothing else than the destructive waves observed. Can it be possible that a solution which so clearly accounts for so many concurrent facts and phenomena, can be otherwise than correct?

In cases of these great ocean upheavals it frequently occurs also that volcanic cones or craters suddenly form and project themselves in midocean, pouring out lava, ashes and cinders till a small volcanic island is the result. Such a phenomenon is also in strict harmony with this explanation, since an interior mass of the crust dropping loose might tear out a hole in the ocean's bottom. But the ocean would not, as might be supposed, empty itself through this opening into the molten bowels of the earth; because the pressure of the internal vapors and lava would be greater than that caused by the weight of the water. The result would be, as stated, the formation of a new volcanic island following the first shock.

In singular conformity to this explanation of the cause of earthquakes we find recorded in several instances a permanent elevation of the earth's surface of several inches and often a few feet directly over the centre of such disturbance, particularly after a severe shock. How so well account for this as in the manner here suggested—the letting go of a great weight from the lower side of the earth's elastic crust, thus causing not only the primary shock, the succeeding undulatory movement, and the rumbling sounds, but the permanent elevation of the surface as observed? The proof that the undulations of the ground passing off from such a disturbed centre are those of real vibrations, such as might be expected from the cause supposed, we find frequent records of the stoppage of clock pendulums by these counter-undulations or opposing swings.

We now come to the question of volcanic eruptions which are always preceded by earthquakes. These shocks generally have their centres of disturbance, especially at the start, directly under the volcanic mountain, and are felt in the usual undulations in all directions. This is easily explained

by the fact that the core of the inner conical crater formed of old lava collected from the dying out and cooling of a former eruption and which had closed up such cone, cools more and more as described, and shrinks and cracks itself away from the wall-rock of the old smooth surface of the cone till finally it drops out of the crater into the lava below, causing the earthquake shock which precedes the eruption. Then suppose the interior crust of the earth encircling the base of the mountain to project downward deeply into the lava ocean on all sides round about, as there are reasons for believing, it is plain that the lava, vapors, ashes, and gases, collected beneath this loosened core, will have no means of escape laterally, and consequently will rush up to fill the space previously occupied by the fallen core, and thus pour out at the apex of the crater or often through new fissures in the sides of the cone where never lava was known to run before. How are such new openings through solid earth and rock to be explained except on our hypothesis? That is the old core, which had cooled to solidity, in cracking away from the normal wall of the cone would tear loose masses of the inner cone itself, thus so weakening and shattering the sides of the crater in places as to allow the force of the reacting lava, as it rushed upward, and took the place of the fallen core, to break through the thin places in the crater-crust and thus form new outlets as the eruption progressed. About a dozen of these breaks and outlets occurred in the sides of the crater of Mt. Etna in the recent eruptions, several of which were entirely new to that volcano.

The fact that these earthquakes in and around volcanic mountains occur more frequently in rainy seasons than in dry, as the records show, is explained by the soaking in of water at the crater basin and through other openings, thus loosening the old lava in places inside of the cone, letting it drop and thus causing the shocks and starting eruptions as our hypothesis claims.

It is also an observed fact that earthquakes of common occurrence generally follow mountain chains as their lines of centre, because manifestly the inner surface of the earth's crust beneath such chains is in a ruptured and broken condition by the very crushing process which originally formed the ridge as before described. Projections from such a rough surface are more apt to be constantly cracking loose and falling than in portions of the crust never crushed into exterior projecting ridges. This is in harmony also with the fact that at considerable distances from mountain chains serious earthquakes scarcely ever occur twice in the same locality; or if they do, they occur at very long intervals apart.

During an eruption it is often observed that new earthquake shocks will be felt at which reports like those of monster cannons will be heard simultaneously with the formation of new openings and flows of lava. How consistent is all this with the explanation here given! As the lava is surging and whirling up the crater new pieces of the cone, as before remarked, are broken loose and fall inward, tearing holes in the sides and causing these simultaneous reports and shocks.

The facts thus hurriedly thrown together and many others that might be named, point to our solution as the only rational explanation of these hitherto inexplicable phenomena. We venture to believe that this solution will fairly stand the test of accounting for every fact so far as observed and recorded, either as regards earthquakes in general or as they are known to occur in connection with volcanic eruptions. By our hypothesis we see that an eruption is not the cause of an earthquake nor is an earthquake the cause of an eruption, both being but effects of a common cause as explained,—the dropping of huge masses of the earth's inner crust-surface. A learned writer on this subject remarks, that every earthquake, however slight, is but "an uncompleted effort to establish a volcano;" whereas the establishment of a volcano is but an accidental effect of the falling of a mass of earth which causes both the shock and at the same time so ruptures the earth's crust as to produce a volcanic opening, both effects being the result of the same natural cause.

Believing this explanation of the cause of earthquakes to be correct, we submit it to our scientific readers as among the solutions of Nature's mysterious phenomena which an independent investigation will no doubt yet bring to light.

REPLY TO PROF. FRENCH.—No. 3.

THE LOCUST ARGUMENT.

In trying to break the force of the locust argument against the wave-theory of sound as presented in the *Problem of Human Life*, Prof. French makes a more signal failure, if possible, than upon either the "swiftly advancing" prongs of a tuning-fork, or the killing of men and horses by the "empty noise" of a magazine explosion. We will see, as we follow his admissions and positions, that he dooms the theory at every turn, and renders its admissibility entirely out of the question.

Before entering into the main discussion let us consider an objection which the Professor raises against our estimate of the quantity of air disturbed by the insect's stridulation. We based our argument in the *Problem* upon the fact that the sound of a certain species of locust is heard more "than a mile" in all directions; and hence that it is capable of *shaking*, according to the wave-theory, four cubic miles of air into "*condensations and rarefactions*," squeezing the entire mass together, if the theory be true, 440 times a second (its pitch of

tone being that of the middle A of the piano), with force sufficient to generate the heat required by the theory, namely, enough to add one-sixth to the velocity of its sound, or 174 feet in a second, &c.

Prof. French thought to weaken the force of his fatal objection to the wave-theory by showing that the half of a sphere of air two miles in diameter (the locust singing on the ground) did not contain four cubic miles, or only about the half of it; and thus, with a great flourish, he aimed to disparage the accuracy of our calculations. To answer this, we need only to state what would be plain to any one, save a professor capable of such a disengenuous quibble, that if the insect can shake half a sphere containing two cubic miles of air, by singing on the ground, it would shake a whole sphere containing four cubic miles if it should sing on a balloon a mile from the earth, as its sound would then reach a mile in all directions.

But we did not say that this species of locust could be heard "a mile" in all directions, but *more* than a mile; and it was on this that we based our calculations. It is well known that these same insects have been heard by hundreds of persons during the last two summers on the opposite side of the narrows below New York at a point where the bay is about two miles wide, thus more than doubling the "four cubic miles" of our estimate actually shaken by the locust.

But why did Prof. French resort to this weak quibble, when the supposed agitation of even *two cubic miles* of air by an insect into such condensations and rarefactions would be just as bad for the theory, since it would be a self-evident impossibility? Even Prof. French admits this, for he at once goes to work to show that the locust does not stir the air at all by its stridulation, except that which is in immediate contact with its body, and that the rest of the mass of air agitated by the sound, after the first wave is started, shakes itself, "*by virtue of the inherent characteristics of the air*" (page 263), and as "*the natural result of the elastic character of the medium*" (page 265). These quotations are some of his very words, and they agree precisely with the position taken by Prof. Humphreys of Vanderbilt University, Nashville, Tenn., in which he says—"*A wave once made moves of itself, and the locust has nothing more to do with it,*" as will be more fully illustrated after a little, by an extract from our reply to that Professor. To prove that Prof. French takes the same view as that of Prof. Humphreys, here is an extract from his criticisms which shows that the work of the insect is confined exclusively to the air in contact with its body and that all the rest of the air thoughout the four cubic miles agitates itself by its "inherent characteristics" after the locust starts the first wave. Reader you will now have a specimen of the profound depths of philosophical science as taught at Urbana University, copied from the *New-Church Review*, page 263:

"Granted, for the sake of the argument, that the locust *can and does fill four cubic miles of air with the sound of its stridulation;* it is of course, true, that every cubic inch of air in the four cubic miles undergoes *sonorous agitation*, but what does the wave-theory of sound require of the locust for the production of this effect? Does it require that insect to load itself with the weight of four cubic miles of air and to shake it bodily to and fro 440 times per second? Quintessence of absurdity! All that the locust is in fact required to do, and all that the wave-theory teaches that it does do, is to *overcome the resistance which the air in actual contact with its vibratory organism opposes to the rapid motion of its stridulation.* Two factors enter into the measure of this resistance, namely, the surface of the vibrating organism and the velocity of the vibratory movement; given these two factors, *and the work done by the insect is known.*"

Now before proceeding further, let us notice the self-contradiction manifest on the face of this extract. The Professor saw by our argument that the salvation of the wave-theory depended upon confining the "work" of the insect to the movement of the air directly in contact with its "vibratory organism," since it was manifest even to this most superlatively weak investigator that the locust had not the physical strength to "fill" one cubic foot with the condensations required by the theory. But while thus unavoidably limiting the insect's effort to the air in actual contact with its body he wildly admits that it "*does fill*" "with the *sound* of its stridulation" the entire mass throughout which it can be heard. And as "sound" consists alone of the "condensations and rarefactions" produced by the vibrating instrument, as all authorities assure us, the insect then "*does fill*" four cubic miles with actual "condensations," which manifestly require "work," while this "work" of the insect, he asserts, is confined to the air directly in contact with its "vibratory organism"! Thus again do we see how impossible it is to write one paragraph in favor of the wave-theory without destroying it by self-contradiction. Clearly, if sound consists alone of "condensations and rarefactions" of the air, as all writers teach, and if the locust "does fill" even two cubic miles with its "sound," it must condense the whole mass of air thus *filled* or else it does not "fill" it. Is not this plain? Most assuredly the air cannot "*fill*" itself with condensations by its "inherent characteristics," unless it actually compresses itself or squeezes itself together by its own "elastic" nature. How then can the locust "fill" the four cubic miles with its sound (condensations) while the air does this very "work" itself by its "inherent characteristics," and while the insect's "work" ends with the air in actual contact with its body?

It is positively inconceivable that a man pretending to be a scientific thinker should have such a crude comprehension of mechanical philosophy as

to suppose that a system of condensations,—alternate compressions and expansions of an elastic body,—could go forward of itself throughout four cubic miles by the "inherent characteristics" of such body, doing the mechanical work of generating heat and cold, with no adequate mechanical force to produce and keep it up! To say that it is "the natural result of the elastic character of the medium," or produced by its "inherent characteristics," is to talk such unpardonable nonsense as would subject a beginner in natural philosophy to a just reprimand by his teacher. No inert body can move of itself however "elastic," or whatever its "inherent characteristics," and no possible motion to the mass of such body can be conceived unless it is caused by an original moving force external to it. If sound consists of physical condensations of the air, as all science teaches, then every particle of such condensation is due to the original mechanical energy of the sounding instrument which produced the tone. Is it possible that we have thus to state to a professor of physics such a superlatively superficial fact and principle of mechanics? We are positively ashamed to confess that there is one single professor of physics in America who requires this elementary information. Yet it is a fact that there are hundreds of them. All writers on sound without exception tell us that the air particles as sound-conductors act like a succession of springs impinging upon each other. The vibrating sonorous body, they tell us, compresses the air directly in contact with it, those particles compress the next-adjacent air, that the next, and so on as far as the sound is heard. How absurd then to suppose that any part of this compression of the various springs in the series is not due to the first and original impulse! But Prof. French supposes that the entire work of the sounding instrument is confined to the first spring moved, that there its work ends, and that all the other springs in the series compress and expand themselves because they are "elastic" or possess the "inherent characteristics" of a spring! Shame on such ridiculous "science"! If sound were not a physical or mechanical effect, as the wave-theory claims, then the case would be different. With sound as an incorporeal substance analogous to electricity, as we maintain, involving no mechanical or corporeal displacement of air, then the sounding instrument has only to generate the pulses and they travel without any mechanical impulse by a law of conduction as does electricity, and at various rates of velocity through various media according to their conductive quality. How simple and beautiful are these analogies of Nature!

But Prof. French fortunately lets out the true cause of his terrible confusion and misapprehension of the whole subject by an illustration of a boy stirring a tank of water with his hand till the whole contents of the tank are thrown into motion; and he then proceeds to calculate the weight of this body of water, and the amount of force the boy must exert to displace continuously such a weight of water. Now we feel sorry in our very heart that we are obliged to explain so simple a matter to a great scientist. Can he not comprehend that there is no similarity at all in the two cases? In the case of the tank of water, when disturbed by the boy's hand, *gravitation* does all the work of agitation except the displacement of the water directly in contact with the hand. Not one cubic inch of the water moves by virtue of its "inherent characteristics," but by the force of gravity. Not so, however, in the case of compressing a succession of springs in which *nothing but the original mechanical impulse has anything the do with the mechanical effects produced.* Strange that Prof. French had not read the full explanation of this very matter of the effects of gravity as given in the "*Problem*" in the correspondence with Prof. Kephart, beginning at page 347. Or if he had been a reader of THE MICROCOSM he might have saved himself from this almost disgraceful exposure. Let us quote, as directly applicable to the case of Prof. French, the part of our reply upon this point to Prof. Humphreys who attacked our "locust argument" in almost the very same language employed by Prof. French. We copy from our reply sent to the *Southern Presbyterian Review*, but which that journal refused to print lest it should hurt the feelings of its friend the Professor. But here it is. and it fits Prof. French's case as if it had been written for him:—

"Prof. Humphreys, notwithstanding his evident incapability of grasping the true relations between cause and effect in physics and mechanics, does really seem to catch a glimpse of the fact that this argument kills the wave-theory of sound unless it can be successfully answered. To pass it over in silence, as so many critics have done who have attempted to review my treatise, would have been to admit its unanswerable character, and thus to abandon the wave-theory of sound; and so, like Mr. Darwin in regard to the cause of inherited characters, he concluded that any sort of an answer would be better than none at all, and would have to be satisfactory. This answer, which he gives in unmistakable language, is a fair specimen of his range of physical knowledge. He begins his criticism by saying, as usual, that my position "is based upon *total ignorance of several physical laws.*" One would think that a professor who can make such a sweeping charge against an author ought himself to know at least something of the physical laws involved in his argument, and about which he charges "total ignorance." But, the truth is, as will be seen in a moment, he does not understand the very first law of natural philosophy, which teaches that *no physical or inert body can move of itself.* He saw plainly if my calculations were correct, and if the condensed air-waves claimed to be started by the stridulation of the locust in producing its sound really depended upon that insect's physical strength for their *continued motion*, and for the actual condensation and disturbance of four cubic miles of air, that it rendered

the wave-theory an almost infinite fallacy. He saw plainly that the movement of a locust's legs, or whatever produces its sound, could by no possibility affect the air more than a few inches around the insect; and that the idea of condensing and rarefying the four cubic miles of air permeated by its stridulating notes, thus generating heat sufficient to add "one sixth" to their velocity, all by the physical strength of this trifling insect, would mathematically prove the wave-theory of sound too ridiculous to be laughed at. Hence he justly felt that something decisive must be done to meet and break the force of this blow, or the current theory was hopelessly shattered. What, then, could he say, except what he actually did say? I quote his exact words: "*A wave once made moves of itself, and the locust has nothing more to do with it.*" [This is also what Prof. French says, and almost in the same words.] Reader, don't shake your head in doubt. Whom the gods would destroy they first make mad! My argument had evidently turned the professor's head—in fact, deranged his intellect—or he never could have penned these ridiculous words. He plainly saw that the case had become desperate, and that the shaking of four cubic miles of air with force sufficient to bend in and out 2,000,000,000 tons of tympanic membranes 440 times a second, as required by the wave-theory, could not be attributed to the strength of an insect, or to the strength of a million horses, even, and consequently, that the only possible way to account for this rapid condensing, rarefying, heating and cooling of the four cubic miles of air, as both the *cause* and *effect* of the locust's sound, was to assume that the insect exerted its strength in condensing only the first wave right at its little legs, and that this entire quantity of air, filled by its stridulations, actually condensed and shook "itself" with a force sufficient to shake a tympanic membrane, weighing half a grain, at every cubic quarter inch of this enormous mass of air. It, of course, occurred to him, as it has to many other professors of physics who have tried to answer my arguments, that a *wave of water* once started by dropping a pebble into a still pond, necessarily "moves of itself"! He could not grasp the idea that the first ring of water raised by the falling pebble was immediately pulled down by gravitation, a tremendous mechanical force standing always ready for action, and that in pulling down this ring of wave gravity necessarily presses up another ring just outside of it, but not quite so high, and so on as far as the water is disturbed. No, he was too superficial and innocent of all true scientific knowledge to see the action of gravitation in the case of water-waves; and really supposing, like a little child, that these waves *moved of themselves* after the pebble had started the first wave, because he could not see what moved them, he carried his innocent conclusions to the action of air-waves in the propagation of sound, as taught by the current theory, and supposed the same condition of things must prevail there, and thus was led to give utterance to the most stupidly imbecile statement ever recorded by a professor of physics, namely: "that a wave once made *moves of itself*, and the locust has nothing more to do with it"!

Now, it is a fact, as a moment's reflection will assure us, that gravity cannot come into play in the case of these so-called air-waves which are supposed to constitute sound; for the very essence of the wave-theory is, as every tyro in natural philosophy understands, that these supposed sound-waves consist of *condensations* of the air-particles which act like so many elastic springs. The theory plainly teaches that the compressing of one of these air-springs causes it to impinge upon and compress the next one; this bears against the next and squeezes it together, and in this manner generates the *heat* required by the theory, and so on squeezing and compressing as far as any sound is heard. I thus try to make this matter plain, to show that gravity has nothing to do in the case of these supposed air-waves, but that, on the contrary, as every writer on sound teaches, they are a succession of elastic springs bearing against each other, and that each derives its motion from the impulse communicated to it by the spring preceding it, and all from the first spring compressed. Suppose, now, a thousand spiral springs to be arranged in a row, each bearing against its fellows; and then suppose that I give the first spring a push, and by the strength of my hand compress it, and that this spring bears against and compresses the next, it the next, and so on to the end of the row, is it not plain that the last spring in the row depends just as much upon my strength for its compression and motion as did the first spring touched by my hand? Is not this a self-evident fact of science? But what is the unequivocal teaching of our innocent representative of Vanderbilt University? Why, he insists that my hand moves the first spring in the row, but that the remaining 999 springs *move of themselves* [by their "inherent characteristics"], and that my hand has nothing at all to do with them! Really one's sympathy involuntarily goes out for such a superficial ignoramus, however much one may feel like reproving his insolence. But as much as I sympathize with him I pity Vanderbilt University more, while the readers of the *Southern Presbyterian Review*, imposed upon by such a writer, are equally objects of commiseration."

This extract, from our reply to Prof. Humphreys, settles the only real point made by Prof. French on the locust problem, namely, that the insect stirs the air in immediate contact with its "vibratory organism," and that all the rest of the four cubic miles of atmosphere filled by its stridulations, *shakes itself* by its "inherent characteristics"! How appropriate his exclamation when applied to himself. "Quintessence of absurdity"! No, no, Professor, this desperate resort to the most monstrous mechanical absurdity ever penned by man, is a fair indication of the straight into which the old theory of sound is now driven by this locust-argument; and it shows, also, the desperation to which the same argument is driving physicists who are too stubborn to let go the old theory and confess their error. Plainly if sound is nothing but a mere shaking of the air, which is the central principle of the wave-theory as every beginner in natural philosophy knows, then whatever makes the sound and sends it off must shake the air filled by the sound, since this *shaking is all there is of it.* What puerility to say that the locust "*fills*" a mass of air with waves of "condensation" and rarefaction" (which constitute *sound*), and yet that it does not stir the air except that small fraction directly in contact with its body! The very fact that Prof. French seeks thus to limit the part played by the locust to the air immediately in con-

tact with its organism, is a forced confession that the theory which would extend its effects any further would be absurdly false. Hence his desperate necessity of trying to save the theory by assuming that the enormous mass of air filled with this sound absolutely *shakes itself* into "condensations and rarefactions" by the mechanical force which he calls "*the inherent charateristics of the air*"! The next thing from Urbana University ought to be a self-acting-perpetual-motion consisting of an inert machine driven by its own "inherent charateristics"!

What in the name of reason is to prevent the construction of a million horse-power perpetual motion capable of driving all the machinery in the country, if the air is thus really capable of *shaking* "itself" by its "inherent characteristics" with force enough to oscillate 2,000,000,000 tons of tympanic membranes? All, in the world, that we now lack of such an enormous self-propelling device is the proper adjustment, and the initial power of Prof. French's patent cricket to give it the first kick! He and Prof. Humphreys should combine their talent at once and bless the world and make their everlasting fortune while practically vindicating the wave-theory, and thus save the colleges from the most disastrous scientific defeat ever witnessed.

But this reminds us of a serious puzzle and difficulty in which Prof. French has involved his explanation and the theory he is trying to defend. If the air does possess, as he assumes, the "inherent characteristics" to *shake itself* throughout the four cubic miles after the cricket starts the motion or shakes the first cubic inch by its initial kick, this does not prove that the air possesses the additional "inherent characteristics" of transferring this self-shaking power to solid bodies throughout this mass of air, such as the millions of tympanic membranes which bend "once in and once out" by the impact of each wave when that many ears happen to hear the sound of the locust! Will Prof. French, to save himself, tell us also that it is the "inherent characteristics" of a piece of tendinous fiber or inert gristle to move of itself without being started at all by the locust? Clearly a "drumskin of the ear," a mile away from the locust, cannot receive its initial shake by a kick from the insect, unless the kick acts upon the air mechanically throughout the entire mile of air, thus forcing it against the drumskin and causing it to bend. But Prof. French did not think of this. It never occurred to him that his absurd "inherent characteristics of the air" even if they existed, did not begin to meet the trouble in the way of his theory of sound. It never occurred to him that 25,000,000 men could stand comfortably on the ground under suitable circumstances within hearing of this insect, and that for a whole minute at a time their 50,000,000 tympanic membranes, weighing more than 3,000 pounds, will be bent in and out 440 times a second by this stridulation, if there be any truth in his theory. As these "inherent characteristics" do not apply to gristle, there is manifestly nothing to shake these 3,000 pounds of solid matter except the strength of the insect's legs in forcing the air-waves against all these drumskins; and since Prof. French has given that matter up as the "quintessence of absurdity," and since the wave-theory positively requires it, the only conclusion follows that our critic gives up the wave-theory, as we told him he must do if he attempted to defend it. Is there any help for it?

But an end to this nonsense. If a single cubic inch of air stirs or one tympanic membrane vibrates in consequence of the stridulation of the locust, then such air or membrane stirs and vibrates as the result alone of the mechanical force exerted by the physical strength of the insect; and nothing less than a philosophical dolt could imagine anything different. And as the same sound of the locust fills and shakes four cubic miles of air, according to this mathematically formulated theory, it follows that every fraction of this mass large enough to contain a membrane, or, say, every cubic quarter-inch, is shaken by the strength of the locust with a force equivalent to the displacement of one half grain (that being the weight of one such membrane) 440 times a second. And as there are 65,000,000,000,000,000 quarter-inch blocks of air in round numbers, in the mass named, and each block shaken with a force sufficient to bend a drumskin of an ear if it were present, it demonstrates that according to the wave-theory of sound the locust must exert a mechanical force on the surrounding air, alone by its physical strength, sufficient to move from a state of rest 2,000,000,000 tons of such solid matter 440 times a second. Such is the actual work assigned to an insect by the theory of science which we have the audacity to oppose.

But now comes the amusing and at the same time astounding part of this learned criticism of the locust argument. We give it to the reader in the Professor's own words:

> "Our author finds the weight of this vast quantity of ear-drums something stupendous as usual, and the force, which the locust is called upon to exert in order to agitate all of them, correspondingly enormous. *It does not occur to him that the sound could not travel so far if the air were thus closely packed with tympanic obstructions, yet he protests that he is doing no injustice to the wave-theory.*"

Really, we feel now like dropping our pen in disgust and saying no more. Is it conceivable that a boy who has been to school one year could not see the force of our calculation and expose the shallowness of this criticism? As a matter of

course, if this mass of air were filled with "tympanic obstructions," one stretched at each quarter inch, the sound of the locust would not, probably, penetrate it half a dozen rods! Who ever said it would? And what has this stupid assault upon common sense to do with our argument? The position in the "*Problem of Human Life*" is, that each and every cubic quarter-inch of air, within the four cubic miles permeated with the stridulation of the locust, *is shaken with a mechanical force*, according to the wave-theory, *sufficient to shake a tympanic membrane whether present or not*, since an ear stationed at one of such points would hear the sound. Can we not make a mathematician understand that no matter if not a single ear is present within the entire four cubic miles, each block of air large enough to contain a drumskin must be mechanically shaken with that much force, if there is a grain of scientific truth in the theory? Hence, in order to estimate the mechanical force exerted upon the air by the insect, we had to calculate each cubic quarter-inch of air as the equivalent of force necessary to shake one tympanic membrane weighing half a grain, whether present or not. Then, as there is plenty of room within the mass of air filled by the locust's sound for the free motion of 2,000,000,000 tons of such drumskins, as a tyro in arithmetic can show, it is a fair and legitimate representation of the strength of the insect as we gave it, if the theory be true. Yet with this very calculation definitely carried out in the *Problem* and right before his eyes, Prof. French puts the childish objection just quoted!

We regret that we have to take up so much valuable room in THE MICROCOSM in order to bring this simple and unanswerable argument down to the mental capacity of a University Professor. But such seems to be the case. We had intended to expose several other matters incidentally lugged in by the Professor, but we desist.

PROF. KEMPER ONCE MORE.

In a recent number of the *Christian Standard*, Prof. Kemper comes, once more, to the front on the Moon's rate of fall. He gives us a column article of what he calls "proof." He says he had just seen the January number of THE MICROCOSM, in which his statement of the Moon's fall and the pebble's fall, and the proportion each supplies in pulling itself, &c., was copied and commented upon by us. The reader, no doubt, recollects how *clear* the Professor made it on that occasion! But he now thinks he can make it still clearer, and so he tries. We have not room for the whole column of "Proof," but will give a fair specimen of his pelucid style by copying his "first method" as follows:—

FIRST METHOD.

"Let in *one case* a mass equal to the moon be added to the earth, and in *the other* the pebble's mass. Then the moon and pebble will have the *total accelerations* that belonged to the masses before the additions. Hence, *these accelerations* will now be in the *same ratio* as that of the *compound masses*. But since *each acceleration changes in the direct ratio of the change of its corresponding compound mass*, therefore the *ratio of the accelerations* is *always equal* to the *ratio of the compound masses*. Remove the added masses, and the ratio of the compound masses becomes one of *equality*. Hence, the *ratio of the accelerations* becomes one of *equality*. Hence, the *accelerations are equal*. This, of course, for Newton's unit of time. This is conclusive."

Now some fastidious critics, not familiar with mathematical "methods," might think this "proof" a little foggy; but all such superficial thinkers, as the scientific Editor can assure them, should attribute the trouble to their own want of perspicacity. To us, however, there is not the slightest want of explicitness about this elucidatory "proof," since we have become familiar with the Bethany "method." The Professor clearly and distinctly teaches, that if the earth's mass were added to the moon, minus the mass of the pebble, and if the equality of both accelerations were divided by the ratios of the compound masses, then the removal of one mass would not affect the subdivided acceleration of both masses owing to the equality of the double ratios being modified by the distributed forces of the two units of measure, both apparently being neutralized or otherwise deflected in drawing upon each other. But should the compound masses be so changed in relation to their unequal inertias as to exceed the ratios of the two accelerations during Newton's unit of time, it is manifest that the equation of the *ver sine* would bring the perpendicular tangent of the pebble's paralax at such an angle to the plane of the moon's orbit that the two unequal accelerations would not clash in their compound ratios, though it might require a different unit of time, as Prof. Goodenow urges, to be started at the common centre of gravity. In such event it is plain that the permanent quadrature of the earth's radius ought to deflect the moon's retarded angle at a slight divergence from the pebble's centre of motion, just as Newton teaches, while the pebble itself is accelerating horizontally in its descent upward. Such combined ratios of inertias, masses, and accelerations would necessarily counterbalance the inequality of the earth's centrifugal attraction; and the various aggregates of these compound masses and accelerations, instead of being one of equality, would, in that event, exert an irregular counter-pull upon the *radius vector*, and, according to Kepler's second law, the pebble's impetus would then tend indirectly to check the moon's oscillatory divergence in direct opposition to the teachings of THE MICROCOSM. We thus reach the conclusion that this

equalizing effect of the two unequal masses would change each other under the law of inertia in the inverse ratio of the parallelogram of momentum till the two accelerations would naturally bring the equinoctial term into exact equality with the other two astronomical dimensions, so that the two accelerations would precisely correspond with the two opposite pulls, according to Prof. Gray's demonstration, and thus harmonize the two opposite ratios. "This is conclusive."

Let no man hereafter say that Prof. Kemper is not clear in his astronomical statements.

REPLY TO JUDGE POSTON.

We had prepared a lengthy reply to Judge Poston's amiable article which appeared in last month's MICROCOSM in favor of Universal Salvation. Our reply was composed mainly of short passages from "*Universalism Against Itself*," bearing directly against his points of which that book is full. The MICROCOSM, however, being so crowded this month we have deemed such a lengthy answer unnecessary, referring those who wish such reply to the book itself. We will give here, however, a very short answer which the Judge, as a good lawyer, must see totally spoils his case before the jury. Here it is in brief:

The Judge calls a witness to testify in open court upon the question of the ultimate salvation of that class of mankind called the "poor" after assuming the ultimate salvation of all infants, idiots, and those who never heard the gospel, without of course any fault of their own, etc., upon which we make no objection. This *witness*, whom he summons to testify as to the future salvation of all the *poor* in heaven (for that is the salvation remember which he is undertaking to prove,) is no less an authority than *Jesus Christ*, whose testimony is clearly unimpeachable and therefore must be received. But the Judge, as an eminent jurist and counsel, knows if he brings into court a witness he is bound to accept all he has to say pertinent to the point actually in evidence; and if there is anything in his testimony that is the least obscure he is bound to accept the explanation of the witness himself as to what he meant when testifying. No lawyer will dispute this. Thus premising we come directly to the testimony.

The Judge quotes as his proof Christ's words in Luke vi: 20, "*Blessed* be ye *poor; for yours is the Kingdom of God.*" Now did the witness in thus promising the blessing of Heaven to the "poor" simply mean those who happened to have no money, such as highwaymen who rob travelers, or penniless, barn-burning tramps, who have not the slightest respect for Christ or His gospel? Scarcely. Allow the witness to explain himself, as he does so clearly in another record of the same testimony. In Matthew v: 3, he tells the court that he did not mean the "poor" in the ordinary sense of that word, but "Blessed are the *poor in spirit; for theirs is the Kingdom of Heaven.*" Then of course the witness must mean that those who are not thus "blessed"—the opposite of these "poor in spirit"—the proud, defiant, and haughty in spirit, will be lost, or will have the exact opposite of this "blessed" state; that is, they will have no share in the "Kingdom of Heaven." Turn back now to the very record from which the Judge quoted, and where his witness is continuing his testimony, namely, in Luke vi: "Wo unto you that are rich, [the opposite to those that are *poor* in spirit]; *for you have received your consolation*," verse 24. Not the "rich" in the sense of those who happen to have money, as a matter of course, for they can be even better and more praiseworthy than can the *poor* in the sense of penury, as they can do more good by a proper use of their riches, like for example, our great and good and rich Peter Cooper just gone to his reward in heaven. What! asks Judge Poston, "*Reward in Heaven?*" Why, such a thing is preposterous. We get our *reward* here as we go along, while *Heaven is a free gift!* But here is his own witness in the very record to which he referred, who says: "Rejoice ye in that day, and leap for joy, for, behold, *your reward is great in Heaven.*" Verse 23. Now "that day" and "heaven" here mean the *day of eternity* and the *Kingdom of glory* as a matter of course, as the Judge necessarily admits, since that is exactly what he summoned the witness to testify about! The Judge cannot repudiate his own witness nor reject the resistless force of his testimony by resorting to the usual strategy of Universalist ministers when cornered upon these texts, that all this *conditional salvation* and *beatitude*—this reward in heaven, etc., simply relates to the present life. No, no; the Judge has forestalled himself upon this matter by placing the witness on the stand for the express purpose of testifying, not with reference to the condition of men in this life, but to their final or ultimate salvation in the future life. If the witness is testifying about the present life, then his promise of the "Kingdom of God" to the "poor" amounts to nothing. The learned counsel is forced, therefore, to take the testimony as he himself at first intended it and used it—directly and only applicable to the future and immortal state of being. We are extremely sorry thus to spoil his case, and unceremoniously throw him out of court by such a mild cross-examination of his witness, but we are forced to do it in the interests of justice. These singularly self-annihilating efforts of Universalists are what we had the honor, forty years ago, of first christening "*Universalism Against Itself*," and the more we note the efforts of candid writers like the Judge, to prove the doctrine of unconditional future salvation, from the Bible, the more appropriate does that expressive title seem.

Remember, then, that by the undeniable admission of Judge Poston, in putting the first question to his witness, and even in putting him upon the stand to testify, this term, "blessed" must of necessity be accepted by him to mean *ultimate salvation* throughout this entire testimony, and that the "Kingdom of God" and "Kingdom of heaven" promised to certain characters cannot, to avoid trouble, be shifted to the present life in defiance of all rules of evidence, but must mean the "Kingdom" of ultimate glory and nothing else. Some other Universalist might try to evade this, but manifestly the Judge has rendered himself hopelessly helpless by committing himself in the presence of the court to the entire testimony of his witness. We close the case to the jury, therefore, with a brief summary of this impartial evidence, as follows:

"*Blessed* are the poor in spirit; for theirs is the Kingdom of heaven," in the future life, of course. "*Blessed* are they that mourn; for they shall be comforted," in the future life. "*Blessed* are they which do hunger and thirst after righteousness; for they shall be filled," in the future life. "*Blessed* are the merciful; for they shall obtain

mercy," in the future life. "*Blessed* are the pure in heart, for they shall see God," in the future life of course. "Rejoice and be exceeding glad for *great is your reward in heaven*," also in the future life. (Math. v.) All these expressly conditional *blessings* and promises of reward in heaven, remember, Judge Poston positively admits to relate to a future life, and to the ultimate beatitude of the various characters named by the witness, —a very poor show for universal salvation! Unfortunate attorney! He meant well for his "poor" client; but he lost his case by inadvertently summoning the wrong witness. If he will thoroughly read "*Universalism Against Itself*," before attempting the defense of another such client, he will no doubt do better; for he will then know which side of the case to take, and what kind of witnesses to subpœna.

In conclusion we remark, in all seriousness, as we have frequently done before, that no Universalist can put his finger upon a single text of scripture, by which to sustain his doctrine, that does not directly or indirectly condemn it. If Judge Poston thinks otherwise let him try it by sending three of his strongest proofs. Indeed the only course for a confirmed Universalist to pursue, if he is determined to stick to the doctrine of an unconditional future salvation for all men is to reject the Bible entirely and appeal to the book Nature. But will this appeal help the case? No; for he will there find, as did the apostle, that "whatsoever a man soweth that shall he also reap;" and if he is of a logical turn of mind, he will draw about the same sensible inference that the apostle did, namely that "he that soweth to the flesh shall of the flesh reap corruption; but *he that soweth to the spirit shall of the spirit reap life everlasting.*"

MINISTERS TURNING ATHEISTS.

We have received a letter from Dr. W. D. Jordan, of Chillicothe, Mo., announcing the startling news that three leading clergymen in and near Kansas City,—one a president of a college,—have publicly renounced the Bible and have virtually declared themselves athests, two of them outspoken. We will not mention their names at present, but will state as a suggestive fact that all these have followed the lead of Joseph Cook, Dr. McCosh and Henry Ward Beecher, starting just where they started, with an acceptance of Theistic Evolution, but, unlike those distinguished leaders, they have at once reached the legitimate fruit of the new departure—atheism—where the others would also have landed before this had they been equally consistent. Another suggestive fact is that two of these very ministers named by Dr. Jordan had their attention called, some time ago, to the "*Problem of Human Life*," as a complete antidote to Darwinian Evolution, both of whom, however, refused to read the work. This, at least, is the information we have received from friends who are intimately acquainted with said ministers. It is also true that our friend the late W. L. Barnes, more than two years ago left a copy of the "*Problem*" with Mr. Beecher, with a request that he read it. On calling a week or two later, the book was returned to him unexamined, with the remark that Mr. Beecher had no time for such reading! Result:—a thrifty growth of Theistic Evolution, whose fruit will be atheistic materialism, as in all cases where the monkey idea is consistently carried out. It begins with an admission of *theistic* evolution (when driven to the wall by open Darwinism), as better than no God at all, and with a faint hope that somehow or other such modified evolution may be made to harmonize with the Bible. But it soon comes to pass that evolution even with this theistic attachment, if true totally destroys the creative work of God as portrayed in the Bible. The next step is to deny the account of Genesis entirely. Next, away goes the inspiration of the rest of the Scriptures; for if one part is a mistake or an invention, what reliance can be placed in any? Next, with the Bible untrue and rejected, why believe in a God? Of what value is faith in a God who did not and consequently would not or could not reveal Himself? Hence the next step is atheistic materialism, and we firmly believe that it is only the want of consistency or of logical reasoning power that keeps any man from the maelstrom of atheism who ventures to strike out one league from shore into the open sea of evolution. It becomes the duty therefore of every pastor to lose no time in fortifying himself against the very initial steps of accepting the development theory, however cunningly it may be labelled "theistic" by such scholarly divines as Joseph Cook and Dr. McCosh; and when thus armed, it is the equal duty of every minister to raise the danger signal in his congregation by which to warn his people against the insidious foe. We will do our part in THE MICROCOSM to aid the clergy in this good work, and if the people of the country, especially the church-going people, are not warned in time and doubly armed to meet the very first attack from whatever source, it shall not be our fault. If ministers would wake up to this danger before making the first overt concession to Darwinism, and array their minds against its dangerous tendency by a positive attitude of resistance, they would both save themselves and them that hear them. Without this resolve and its consistent execution on the part of the clergy generally, a single generation hence will see left to the church the mere name of religion, and only the shadow of primitive Christianity.

ELDER THOMAS MUNNELL AND CAPTAIN CARTER ON THE MICROCOSM AND MOON-CONTROVERSY.

Thomas Munnell, one of our oldest contributors, publishes in the *Apostolic Times*, of Lexington, Ky., a carefully written resumé of the gravitation controversy that has been going on in THE MICROCOSM during the year past. It is an impartial review of the whole battle-field given by a looker-on who had no reason for prejudice one way or the other. This resumé we will print next month, as we have no room for it in the present number.

Capt. Carter sends us also a very candid and able resumé of the same controversy in which he took some hand. His paper will appear in that or the next (July) number, and would be a fitting close to the gravitation controversy for the present volume. What another year may develop upon this and related topics of physical science, no one can tell; but we have every reason to think that the real campaign in this general revolutionary direction has but fairly commenced.

ERRATA:—We regret that Prof. Kephart's excellent article last month was marred by two typographical errors. For *theologic* (p. 258, col. 1, last line), read *geologic*. For *work* (p. 259, col. 1, 8th line from top), read *mark*.

WILFORD'S MICROCOSM.

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IS MAN'S RELIGIOUS NATURE AN EVOLUTION?—No. 1.

BY REV. JOS. S. VAN DYKE, A.M.

It is nearly impossible to resist the conviction that the hypothesis of man's origin from the ape-family is environed with difficulties more numerous and more serious than those which connect themselves with the theory of his immediate creation. Nor is any one disposed to deny that difficulties which are many and formidable in connection with the assumed transmutation of animal instincts into reason and conscience, become nearly or quite insurmountable in conjunction with the question, "Is man's religious nature an evolution?" Moreover, every unbiased investigator will be inclined to concede that the arguments presented by the advocates of the development-theory become fewer and feebler in exact proportion as the more intricate portions of the problem come under review, the reasoning being decidedly weakest just where it should be the most powerful. The greatest force is laid upon the evolution of the physical nature, where confessedly man approximates most nearly to the brute-creation; less, upon that of the mental, where manifestly the difference is wider; still less, upon that of the moral, where the divergence is even greater; least of all, upon that of the religious, where the difference amounts to a chasm that is simply infinite. This will become apparent to the reader if we present in succinct form all the arguments we have been able to discover in the many books which assert or assume man's evolution from inferior animals. Their arguments, as we might expect, proceed upon the assumption that civilized man, in reaching his present advanced position, has passed through a state of absolute savagery. The task now before us is to answer the following argument:—

"There is no evidence that man was aboriginally endowed with the ennobling belief in the existence of an Omnipotent God." (Darwin's "Descent of Man," vol. 1, p. 62.) "There is abundant evidence . . . . that numerous races have existed and still exist, who have no idea of one or more gods, and who have no words in their language to express such an idea." (Idem. p. 63.) The Paraguay Indians, according to Azara, had no ideas of religion. Sir John Lubbock says, "According to the missionaries, neither the Patagonians nor the Araucanians had any ideas of prayer, or any vestage of religious worship." (Pre-Historic Times, p. 536.) Among the Fuegians, Admiral Fitzroy "never witnessed or heard of any act of a decidedly religious nature." (Idem. p. 541.) According to Crantz, the Greenland Eskimos "have neither a religious nor idolatrous worship, nor so much as any ceremonies to be perceived tending thereto." Herne states that the North American Indians had no religion: Colden, that the celebrated "five nations" of Canada had no religion and no word for God. Burnet, says Lubbock, found no semblance of worship among the Comanches. "The Andaman Indians are stated," says Lubbock, "to have no idea of a Supreme Being." (Pre-Historic Times," p. 437.) "The Australians have no systematized religion, nor any worship or prayer." (Idem. p. 447.) Some savages, it thus appears, have been discovered who have no religion whatever — some say very many. What follows? "Such," says Lubbock, "was probably the condition of primeval man." Why draw this inference? "Because it is difficult to believe that any people who possessed religion would ever entirely lose it." Wherein consists the difficulty? "Religion appeals so strongly to the hopes and fears of men, it is so great a consolation in times of sorrow and sickness that it is hard to think that any nation would ever abandon it altogether." Though so many savage tribes are utterly destitute of religion, still, "if we include under the term religion the belief in unseen or spiritual agencies, the case is wholly different; for this belief seems to be almost universal with the less civilized races." (Darwin's "Descent of Man," vol. 1. p. 63.) Though a savage is utterly incapable of experiencing religious devotion, which consists in love, submission, fear, and gratitude; nevertheless, as he passes from savagery to civilization, he converts belief in unseen influences into fetishism, polytheism, pantheism, monotheism. Thus the higher forms of religion are evidently products of human thought, man's religious ideas becoming more complex and more spiritual as he advances in intellectual and moral attainments. To this spiritual sentiment we have some distant approach to the deep love of a dog for his master. Indeed, Professor Braubach "goes so far as to maintain that a dog looks on his master as a god."

The first sentence in the above paragraph is a sweeping assertion, adroitly worded and quite manifestly designed to clear the ground preparatory to the establishment of an opposite theory. Prone, as evolutionists too frequently are, to assign existing effects to causes which have not been proved adequate, Mr. Darwin seems disposed to consider it unnecessary to account for man's religious nature—simply denying that it was an original endowment, and leaving his readers to conclude that of course it is a subsequent evolution. Is this denial so easy of acceptance that it may be safely left unsupported? Or does it stand unaccompanied with proof because of the difficulty in presenting evidence to substantiate it? "No evidence?" Whence then the basis in which inheres the sense of obligation to moral law? Whence the conviction, which is certainly quite general, that our relations to Deity are more intimate and more powerful than the tie resulting from commands arbitrarily given? How does it happen that so many entertain the conviction that there is a Supreme Being who possesses moral excellencies which man's constitution forces him to revere? Why is the command, "Thou shalt love the Lord thy God," capable of influencing the human family? Is it merely because the religious emotions have congealed into a confirmed habit through the operation of Natural Selection? Then, whence came the original germ of these emotions? These savages, who are declared to be, and to have been through all past generations, entirely devoid of religion, why are they susceptible to spiritual ideas? How did they become capable of conceiving of God as a being of truth, goodness, love and power? If their ancestors were not endowed aboriginally with the ennobling belief in

the existence of an omnipotent God, they must have been endowed with a religious nature, unless we are prepared to admit, contrary to the teaching of evolution, that this noblest of faculties may be developed, not by the tardy process of Natural Selection, but in a few months by instruction. To be without religion, is one thing; to be incapable of becoming religious, is quite another Which of the two are we to understand was man's original condition? Evidently the latter was not his condition; for the irreligious savage, who is declared to be in this respect fully as far advanced as the first man, can not only be inspired with a conception of God as the embodiment in infinite measure of all moral excellency, but can be induced to give expression to the reverential feelings of his heart —indeed, he is self-moved to worship. Reveal to him the evidences of divine love exerted in bestowing blessings and he is forced to bow in adoring gratitude. This religious element, to which there is not even the slightest approximation in the lower animals, enables his soul to cling to his Father above even as the ivy clings to the rock.

THE FREEDOM OF THE WILL.

BY PROF. I. L. KEPHART, A. M.

The mind of man possesses three distinct, fundamental powers—the Intellect, the Sensibilities and the Will. The will is that power which the mind, the man, the *ego* has of determining or deciding what it will do, and of putting forth volitions accordingly. It is the capacity of electing, of originating, from the spirit itself, choices and acts. Of itself, the will does nothing. It is the man, the *ego* that determines or decides what he will do, and puts forth volitions accordingly, and this we call *willing*. The act of willing includes two elements: choice and volition. When the man has chosen and put forth the volition he has *willed*, has exercised his will-power. By the freedom of the will is meant the freedom of the man to will to do just what he pleases to do. He may not be able to do what he pleases; but if he is *free to will to do* what he pleases, his will or willing faculty is *free*, though his body be bound or powerless. "A free action proceeds from a principle intrinsic to the agent, or is determined by the agent himself, *and is in accordance with his wishes.*" To be morally responsible for wrong-doing man must, at the time he wills to do wrong,—decides to yield to the unholy influence,—possess the power to say to that influence, I will not yield to your unholy attraction, —I will obey the influence that admonishes me to do the right. The possession of this power, the power to reject the unholy influences and yield to the holy, and at the same time the power to do the opposite, is what is implied in THE FREEDOM OF THE WILL. This power, the human will, the human being must possess, or he is incapable of virtue and is not an accountable or a rewardable being.

That he is an accountable, rewardable being, reason and consciousness declare in tones too loud and too overwhelmingly convincing to be gainsaid or set aside. We are accountable for our choices and volitions. We hold ourselves accountable for them before the bar of our own consciences. Conscience accuses us when we do wrong; it commends us when we do right; therefore the human will *must be free.*

But, as there is a limit to all the faculties of the mind, so is there a limit to the freedom of the will. The moment divine or diabolical influences are brought to bear on an individual will, which are out of exact proportion to its strength of resistance, that moment the will loses its freedom. It then comes under the power of the same law of cause and effect that rules in material forces. This is a point worthy of special notice. And the moment the choices of a being are not the choices of a free agent, but are the effects of causes *ab extra*, that moment those choices cannot involve moral character. Then the man ceases to be an accountable being, and becomes a mere machine. To the thinking mind, these declarations are axioms.

Again, as there is a limit to the power of the will to resist influences, and, consequently to its freedom, so is there a limit to human freedom in another sense. Man is free to do the wrong and accept or suffer the consequences of his wrong choices and acts; but he is not free to do the wrong and evade or escape the penalties that his Creator has attached to sin. The Judge of all the earth will do right. He will reward every one according as his work has been. Freedom *under law*, is the only freedom possible to an intelligent finite being.

In matters that pertain to the practical affairs of life, the freedom of the will, as above defined, is not questioned by any one. It is only when considered in its practical bearing on moral character, and upon the moral and religious duties of life, that there arises a disposition to question its reality and man's consequent moral accountability. In this connection there arise in the minds of honest investigators questions like the following:

1. If the good man does right, is it because his will freely chooses to do so; or, is it because his moral faculties predominate over those that cater to his lower nature?

2. Must not the evil minded man, of necessity, seek to harmonize his conduct with his predominating lower nature?

3. Does not the man who is evenly balanced in his tendencies toward good and evil, invariably adjust his conduct to the good or the bad influences by which he is at the time surrounded?

4. If freedom of the will be predicated of every human being, are not such phrases as "extenuating circumstances," "restraining influence," "ungovernable impulse," meaningless expressions?

5. Do not men do again that for which their consciences have already severely chastised them? Why do they act thus if they are free to act otherwise?

6. How can the will be free when it evidently performs the function of a medium between a cause and its effect—the circumstance or motive, or influence the *cause;* the will the medium; and the subsequent action the effect?

7. As there stands at the helm of a ship reason and judgment to direct the ship's course, so may there not stand at the helm of our will, goodness, passion, or whatever attribute of the mind may at the time be called into action by the peculiar circumstances of the time, place, and condition, and it determine our choice and volition?

A young reader of THE MICROCOSM, having read my article in the March issue, wrote me stating the above questions, admitting his inability to grapple with them successfully, and requesting that I would treat the subject through the columns of this magazine. This must be my apology for choosing as my theme at this time, a subject that is old, but is nevertheless, one of profound interest, and replete with material for careful thought and candid investigation.

1. In answer to the first question, I would say that the good man's act may be the result of his

freely choosing to perform that very act at that very time, or it may be the result of his moral faculties predominating over all his tendencies and all inducements to do the wrong. If it is the result of the former (as many good acts are) it is a rewardable, a moral act just to the extent that, in the face of inducements to do the wrong and his ability to do it, he *willed* to do the right. Were there no inducements to, or possibility of doing the wrong, man would be incapable of virtue. But as said above, when the inducements to do right or wrong exceed the power of man's will to resist them, his will loses its freedom, and he is not responsible for the act.

If the good act is put forth (as it may be) because the man's moral faculties predominate over all his tendencies and all inducements to do wrong, then the good act is still meritorious and rewardable *to the extent that the man in his previous life, by willing to do right and resisting inclinations to do wrong, has contributed to the development and strengthening of his moral faculties.* That man can contribute to these results is a self-evident truth. We are beings of habit. Our passions and propensities are given to us for a wise purpose. They are to be servants, and not masters. They are to be restrained by reason, and directed by judgment. If, through neglect, or indifference, or over-indulgence, we permit them to usurp the throne that of right belongs to reason and judgment, we are responsible for the usurpation and all its consequences. But if, in our sovereign freedom, we heed the voice of reason and conscience, and restrain our passions, resist inducements to do wrong and cultivate a habit of resisting and restraining what tends to evil and of doing the thing that is right, then the moral faculties, in due time, preponderate, become a cause, and the right thing done is the effect; and to the extent that by willing right and doing right we have given existence to the preponderating tendency to do right, are we now rewardable. Living right to-day, makes it easier for us to live right to-morrow. Choosing to do wrong to-day, establishes a very strong probability that we will do wrong to-morrow. The oftener a wicked or a good act is repeated, the more does the repetition of it become a confirmed habit; and the more the habit becomes confirmed, the less does the probability and even the possibility become that the man will ever change. In that sense, "many to day are hopelessly in bondage to the flesh-life." Not that they cannot change, but because the flesh-life propensities have become so strong that they *will not change.* The slaves of the intoxicating cup, by the grace of God, possess the power to break the chains of appetite with which they have bound themselves. A few whose cases were apparently as hopeless as any case can be, have done so; but the great majority do not break those chains—not because they cannot, but because they will not. A further consideration of the subject will appear in the next MICROCOSM.

THE MICROCOSM AND THE MOON-CONTROVERSY.

BY THOMAS MUNNELL, A.M.

[From the *Apostolic Times.*]

During the past year, the discussion of a very exciting question has been most vigorously conducted between Dr. Wilford Hall, editor of the MICROCOSM, on the one side, and Professors Godenow, Kemper, Erret, Gray, Carter and Comstock on the other. The question of gravitation has been regarded as not only settled, but intactible ever since the days of Newton. Does the law of accelerated motion, as seen in the falling of a stone near the surface of the earth, prevail in the moon's departure from an imaginary fixed tangent to its orbit? This the editor stoutly denies, and the said professors as stoutly affirm—at first. I have attentively read, and I think, comprehended all that has been said, except a part of Prof. Godenow's astronomical mathematics, and I present for the readers of the *Times* a brief resumé of some of the points made and the results reached. The question is vital in astronomy, calling out the best efforts of the respective combatants; and if the professors have not successfully defended Newton's law of gravity, it will go far to unsettle the public mind as to the infallibility of scientific dogma, and will give the infidel and scientist a long-needed back-set while trying to offset Bible facts by supposed unerring scientific conclusions. The attack upon such a man as Newton, and his undoubted law of gravitation, seemed not only daring, but absolutely reckless, and even a respectable showing of argument was more than was looked for; and while the professors—all gentlemen of decided scientific culture—handled their forces remarkably well throughout the struggle, I think the following counts may be fairly set down to the credit of the editor:

1. Daring as was the assault made upon this time-honored law, his opponents did not, as some others affect to do, regard them as unworthy of their most serious attention. Mr. Tyndall, on reading Dr. Hall's attacks on the wave theory of sound, is said to have remarked, as everyone has heard, "It is funny;" but these gentlemen have not thought that such a remark could break the blows of the MICROCOSM against this favorite scientific belief. To command such attention, by an attack upon such a scientific idol, is of itself no small achievement. But more especially the fact that the editor has thrown his opponents into so great a confusion, not only contradicting one another, but some of them contradicting themselves in the positions taken at different times, in vainly trying to defend the argument of the falling stone. At first, the imaginary "fixed tangent" was boldly defended, and then by degrees given up; then they were forced to abandon lunar accelerated motion in any sense resembling the stone fall; they contradict one another as to action and reaction in lunar and terrestial gravitation; some of said professors contended that the moon pulls itself toward the earth with one-eightieth the force that the earth pulls the moon; others that the attraction between them is exactly equal; and others deny that the moon pulls itself towards the earth at all; and so on, until it has been very evident that the professors are put to their very best to keep their feet —in the hands of the robust athlete of the MICROCOSM.

2. The notion that a stone dropped from the moon would reach the earth in the same time that the moon would pass nearly ninety degrees round its orbit—its departure from a fixed tangent keeping up with the accelerated motion of the stone, and so furnishing elements of important astronomical calculations—was fiercely assailed by the editor, who soon compelled his opponents to grant that the resemblance between the moon-fall and the stone-fall would only hold good for "short distances," for "small arcs" on the moon's orbit, then "very small," and at last "infinitesimally small arcs," until the editor was left master of the

field again, with the conviction firmly established in the minds of thousands of intelligent men and hundreds of college professors, that it was a mistake ever to have conceived that fixed tangent, and that the only tangent to be thought of, is not one that has been left ninety degrees behind, but the one that keeps up with the moon, and is always at right angles with the straight line between the earth and the moon—no resemblance existing between said stone-fall and this supposed departure.

3. The retreating professors were then quickly followed by another attack. Dr. Hall now denied that there is any acceleration in the moon's motion in any sense whatever. Acceleration can be predicated only of bodies moving toward their dominant centres, which is not true of the moon, whose average distance from the earth is always the same; having, in this respect, no resemblance to the stone fall in any way. Nor is there any acceleration in the moon's orbit; for its average rate is always the same, year by year. To call the moon's departure from an imaginary fixed tangent a "fall," resembling a stone-fall, is so clearly arbitrary, and so utterly inapplicable, especially when you pass the ninetieth degree of the lunar orbit, as to forbid all possibility of making that the basis of any astronomical calculation whatever. Here, again, the professors were impotent to save their cause, and left the editor victor once more; for if the moon falls toward no centre, nor from any tangent, no acceleration is predicable of it,—as its fall is only the motion of the end of the index upon your watch-dial, which falls neither to the centre, nor from any one figure to any other figure on said dial.

4. This was followed by another provoking assault. Newton's law that, "Every atom of matter in the universe attracts every other atom directly as its mass, inversely as the square of the distance between them," as demonstrated by Professor Carter, requires that a single particle on the moon shall attract every particle on the earth with as much force as it would attract one particle. Suppose the earth to consist of only one simple, uncondensed particle, and that said lunar particle would attract that particle with a given force, the above law requires that said lunar particle shall attract every particle on the earth, as it is, with the same force that it would attract the supposed one particle—that the pulling power of said lunar atom upon the quadrillions, decillions, and vigintillions of particles in the earth shall not be diminished upon any one terrestial atom by any imaginable or unimaginable multiplication of their numbers. A draft horse that can pull one ton, can only exert half as much power upon each of two tons; but this lunar atom must be just as strong on a million tons of atoms as on one. "*Credat Judæus, non ego*," says the editor. But those who do believe it, hold that therefore the moon pulls at the earth with the same force that the earth attracts the moon; and, therefore, if the earth and moon were free to approach each other, the moon would be responsible for half the work of their getting together. This is true, if Newton's law is correct. But the editor presents an unanswerable argument to show that the attractive power of a particle is weakened on each other particle, according to the number it acts upon, and that the moon, having only one-eightieth of the earth's mass, would be the cause of only one-eightieth of the total motion produced. The argument he finds in the pulling power of the magnet which is diminished in proportion to the mass of iron brought into its vicinity to be acted on; and as the attraction of the magnet is the only resemblance in all nature to the attraction of gravitation, the loss of confidence in Newton's great law of gravitation seems to be inevitable. A distinguished scientist and mathematician, on reading Dr. Hall's article on this subject, in the March MICROCOSM, laid down the paper, saying: "I will never again believe anything to be true in science, till God pronounces it true."

But I have not space to present all the points of controversy in this struggle, and the results. The long-trusted statement that in a vacuum a feather will reach the ground from a given height as soon as a cannon ball, is denied also by the editor, on the ground that its few particles do not pull it to the earth as fast as all the particles in the lead ball pull it, and that their reaching the ground simultaneously, is only so in appearance, on account of the short distance subject to our observance. Whatever may be thought of the outcome of this new departure in science and philosophy, it is too late in the decade to attempt to ignore a cause that in four years has gained 6,000 ministers as subscribers to the MICROCOSM, and that has now the confidence of so many intelligent men out of the learned professions in our land.

THE THUNDER-BOLT PROBLEM.

NORTH RIVER MILLS, W. VA., April 16, 1883.

DR. HALL.—*Dear Sir:* In the April issue of THE MICROCOSM, in your reply to Prof. French, you state that "a thunder-clap is the loudest sound ever addressed to the human ear, particularly when the hearer is in a house struck by lightning." You say, further, that "it [the thunder-clap,] will not stir a feather a single foot from the path of the bolt." "Why? because there is nothing but sound." Now I have noticed when lightning strikes within a quarter of a mile of our house, that the report from it will jar the window-glass. Then, if, as you say, there is no compressed air-wave sent off from it, and no additional gas generated, and if the sound cannot stir a feather a foot from the passage of the bolt, &c., what is it that jars the glass? J. A. COWGILL.

REPLY TO THE FOREGOING.

The case is very plain; and had Mr. Cowgill read the next sentence after what he quoted, it would have been explained to him. We distinctly say: "It [the thunder-clap,] does not send off a compressed air-wave or stir anything *not in unison with its tone*." We state distinctly also, in the *Problem of Human Life*, that thunder frequently jars a window or some other portion of a building by sympathetic vibration, if the part of the building happens to be in exact unison with the thunder-pitch. We have frequently watched, during a thunder-storm, when peal succeeded peal, and from different distances (which, as we were the first to point out in THE MICROCOSM, a year ago, produce tones of *varying pitch according to distance*), and we have noted, as probably others have done, that while certain peals jar the house or some portion of it, other peals, even louder, produce no such effect. How clearly our explanation accounts for this difference! We also state definitely in *The Problem* that a powerful organ-peal has been known to crack a pane of glass in a church for the same reason, the glass happening to be tensioned almost to the point of breaking, and

at the exact vibrational number of the peal which breaks it. This we explain at length as the effect of substantial sound-pulses, and show that its solution by air-waves is an utter impossibility. Let those, therefore, who think with Prof. Tyndall, that it is the *sound* which breaks windows near a magazine explosion, point to one single pane of glass that has been broken as the result of a thunder-peal in a building that has even been struck by lightning, or forever after hold their peace. By the merest chance, a single pane might be cracked by thunder, as in the case of the organ-peal; but a man's common-sense ought to tell him that not only every pane of glass in a building thus struck by lightning ought to be shattered, but the building itself ought to be leveled to the ground, if there is the least truth in the wave-theory, since such would manifestly occur near an exploding magazine. Plainly, if the *sound* of a magazine explosion really breaks windows miles away, the much more intense sound of a thunder-clap ought to break the windows of a building where the bolt strikes. Yet, as we stated in reply to Prof. French, not a pane of glass or any other object is shaken, unless it happens to be sympathetically in unison with the thunder-pitch of tone. What, we then ask, can be the meaning of this fact, except that the wave-theory of sound is a bald fallacy of science

THOUGHTS RESPECTING THE ETERNAL I AM.—No. 2.

BY REV. T. WILLISTON, M. A.

Having shown what my conceptions of God are, as to His triunity, omnipotence, ubiquity, and His having some visible form, the next inquiry will naturally be, How extensive is the *knowledge* of God? All Christians unite in applying the word *omniscient* to the Diety, and in so doing they virtually admit that His knowledge is unlimited. That He discerns the secret workings of all hearts, and that He knows with circumstantial minuteness all that now exists, or that ever has existed, is universally admitted. There are some, however, in whose estimation God, though pronounced omniscient by them is not the *all*-knowing One. With them His knowledge is vastly extensive, but not unlimited. By a few it is said that there may be things which He does not care or choose to know; while by others it is maintained that He *cannot* know, in *advance*, just how free agents will choose and act; and hence He cannot foreknow such events as depend for their occurrence on the choices and doings of such agents. In their opinion God has placed the volitions and acts of moral agents beyond His control, and He can know them and the events depending on them, only as fast as they become actualities. Now it is "for the truth's sake," I trust, and not in an authoritative, dictatorial, or strife-loving spirit that I am constrained to dissent from those who hold these views, and to maintain widely dissimilar views. And if this article chances to meet the eye of any that differ with me as to the omniscience of God, I trust that, whether convinced by the argument or not, they will at least honor it with a patient, painstaking, and unprejudiced perusal.

By two distinct methods, I propose to defend the following thesis: The Knowledge of God has no limit whatever. Before creating anything, even from eternity He with unerring certainty and minuteness knew all things that were to exist or take place. The choices and doings of all His rational creatures were as perfectly known by Him before those creatures or their choices had any being, as they are now known, or ever will be. In short, no additions have ever been made to the knowledge of the Omniscient One. Futurity in all its circumstantial minuteness has ever been as fully open to His inspection as are the present and the past. This view of the divine omniscience I propose to defend—first, by showing what strange (absurd?) inferences are deducible from a denial of its truth; and secondly, by a direct appeal to the sacred oracles. It has been thought by some that there may be things which for some reason God chooses not to know. Can this be true? Is not adsurdity stamped upon the very face of the conjecture—for it is simply a conjecture—that the All-Knowing One could fix a limit to His omniscience, and could *of choice* remain ignorant of some things? How was it possible for Him to know what things to choose *not* to know, without first having *all* things before Him to choose from? The idea of His choosing not to know certain things is absurd; because no one, not even God, can choose to be ignorant of something, without first knowing what that is that he chooses to be ignorant of. But even if God could be ignorant of whatever He chooses to be, it is certain that nothing is so minute or insignificant as to render it His choice not to know it. It cannot be true of Him who numbers the very hairs of one's head, and without whom no bird falls to the ground, that He chooses to be ignorant of any thing, however small or trivial it may seem to be.

Let us next, for argument's sake, suppose it to be true, as is maintained by some, that God did not, when creating angels and men, know with certainty just what their choices, conduct, and destiny would be, nor foreknow such events as would necessarily depend on the character and doings of these free agents. If this be true, what are its legitimate inferences? What other things must we admit to be true, if we admit this to be?

First. If this be true, it follows that God undertook the stupendous work of Creation without foreseeing what the grand issue would be, and without knowing, in advance, what would be the world's history. We all know that the world's history has, to a great extent, been made what it is by the choices, character, and conduct of human agents; and if the Creator did not foreknow exactly how these human agents would choose and act, the future was to Him as a sealed book, the contents of which He could no more inspect, in advance, than we mortals can. With God, therefore, His creating work was undertaken *at a venture*, or as a grand experiment. He could not have been certain that any of the angels would rebel, and have to be eternally miserable; nor was He sure what such men as Cain, or Judas, or Voltaire, or Paine would do, if He should give them existence. So far as events, great or small, have depended on the volitions and acts of free agents—as in truth most events have—the Creator must have been profoundly ignorant of what was to transpire, or of what the record would be in the yet unwritten volume of the future. In ushering the universe into being He was like one who should construct a vast and complicated machine, not knowing just how it would work, or whether it would prove a success or a failure.

Second. Since by the supposition we are examining the doings of free agents were put beyond the Creator's control, or could not with certainty be foreknown by Him, it follows that He could have had no well devised Plan of the vast fabric He was

about to erect, and no great purpose in view that He felt sure of accomplishing. In an enterprise so stupendous in its magnitude and momentous in its results, it would seem as though the Creator, intent on executing some great and fixed design, must have had, or desired to have, a circumstantial plan of the whole structure before Him, ere He began His great work. It is obvious, however, that He either had no such great purpose and preconceived plan; or if He had, that there was no certainty of His being able to carry it into effect. Of what use to aim at accomplishing some noble object, if the object and the scheme for effecting it were liable to be completely frustrated by the unforeseen doings of human or angelic free agents? To render Himself liable to bitter disappointment, or to have a design that He could not be sure of carrying minutely into effect, would ill become the All-wise One: hence it is safe to conclude that He was reluctantly constrained to undertake His creating work with no specific object in view, and with no map or plan of the universe in His mind's eye.

A third inference from the position we are examining is this: The great scheme of Atonement and Redemption was not the outcome of any eternal purpose in the mind of God, but was only an afterthought, a scheme not devised till man's apostasy had occurred and rendered it necessary. If that apostasy was an event which might not take place, or if it hinged upon choices and acts which God, though omniscient, could not foresee, was it not impossible for Him to devise the Atoning scheme, or even to anticipate any necessity for it, till the Fall had actually occurred? In speaking of the Savior, then, as one "who verily was foreordained before the foundation of the world," Peter must have been mistaken. Paul speaks of its being God's "eternal purpose which He purposed in Christ," that His own "manifold wisdom might be known" to angels "*by the church.*" Paul and Peter both thought, it seems, that man's rescue from ruin through Christ's death was embraced in God's "eternal purpose." But how could this be true, if God did not from eternity foresee and anticipate Satan's rebellion and the apostasy of mankind? And how could He anticipate these, if these, volitions and actions of angels and men were not eternally foreknown by Him?

Closely connected with the foregoing inference is this fourth one, namely: After providing a Savior, and offering men salvation through Him, God must have been wholly uncertain whether even one sinner would embrace that offer. Does not a sinner's salvation depend, under God, on himself, his own choice, and his own course of conduct? Does any one love and obey God without choosing to do it? If true, then, that God did not from the beginning know exactly how men would choose and act, was it possible for Him to be certain that Christ's dying for sinners would not prove a stupendous failure? Might not that costly sacrifice have been made in vain?

Before proceeding further, I would respectfully ask, Can that be a truth from which such inferences as the foregoing are logically deducible? Does not reason itself teach that the interests of the universe would not be safe in the hands of a Being who did not, with infinite exactness, foresee what the character and conduct of all free agents would be? Can we adore Him as an All-wise Creator, who could usher a material and moral universe into being without having that universe, in all its objects, all its occurences, and all its rational agents and their doings, distinctly before Him? Can we repose implicit confidence in a Being who was liable to have events occur that He did not anticipate, or guard against; liable to have His creating purpose even partially defeated by finite agents, whose acts He could neither foresee nor control?

For further instruction on the point before us, let us now see whether the testimony of the Bible does not tally with that of reason, and fully disprove the theory we have been examining. If, in the Scriptures, God has anywhere foretold, long beforehand, what certain persons would do, and if His predictions of what they would do have been minutely fulfilled, that fact is overwhelming proof that He foreknows, and ever has foreknown, just how all free agents will choose and conduct. Indeed, I need not have said "long beforehand," for the same thing is proved, even if the prediction precedes its fulfilment by only a few hours or minutes, instead of hundreds of years. It was but a few hours before Peter's denial of Christ that that act of his was foretold; but Peter's doing the very thing that Christ had just before said He would do, proved conclusively that Christ eternally foreknew just what Peter and all other free agents would choose and do. Unless men's motives, choices, and actions are minutely foreknown by their Maker, what enabled Him, long before the Persian Cyrus was born, to speak minutely of some actions that that prince would perform? Was it a purely accidental thing that Cyrus did the very things that God had, through Isaiah, foretold? (See Is. xliv:28; and xlv:1–5.) Examine, verses 13 and 14 of the 15th chapter of Genesis, and see how God gave Abram a brief summary of events that would, several hundred years after, befall his descendants in Egypt. The events foretold, you observe, were such as depended, under God, on the choices and doings of a number of human agents. Joseph's being hated by his brethren and sold to the Midianites, and by them to Potiphar, the conduct of Potiphar's unchaste wife and Joseph's imprisonment, the incarceration of Pharaoh's two officers, the monarch's marvelous dream, and Joseph's sudden transfer from prison to the governorship of Egypt; these, and all the other events and actors in that wonderful history, together with the feelings, volitions, and conduct of each of the actors, must have been accurately foreknown by Him, who, before any of these actors were born, informed Abram in substance what the history would be. Again: Christ is spoken of as "being delivered by the determinate counsel and foreknowledge of God." Is it not absurd to say that God's foreknowledge extended only to the *fact* of Christ's "being delivered," but not to those antecedent volitions and states of heart which rendered it a fact? If God foreknew the event, did He not also foreknow all the secret feelings, motives, and choices that led to that event? Again: In Isaiah, 46th chapter, verses 9 and 10, God makes it one proof of His divinity that He, unlike all other beings, "declares the *end* from the *beginning*, and from ancient times the things that are *not yet done;*" in other words, that He, from the very beginning, looks through futurity, with all its finite actors, and all its events. If He did not, "from the beginning," know just how angels and men would choose and act, "the things that are not yet done" would as really be unforeseen by Him as they are by us. Again: After exhorting the Philippians to "work out their own salvation with fear and trembling," Paul adds, "It is God which worketh in you both to will and to do of His good pleasure." Can God

"work in men both *to will* and *to do*," if He does not foreknow just how they "will," and just what they will "do"? From the passage just quoted, and from several others that might be cited, we learn that the choices and doings of finite agents are in the Scriptures ranked among the works of God. He is often represented as influencing men to perform certain acts, or as restraining them from doing what they were inclined to do; and He is sometimes spoken of as doing the very acts that human agents do by His permission. The Bible fully warrants the assertion that the acts of free agents are a part of God's works, and it affirms that "known unto God are *all* His works from the beginning of the world." And while His *knowledge* is without limit, so also is His efficient, all-pervading *agency*. Not only does He foreknow all things, but He "*worketh* all things after the counsel of His own will." In other words, He executes or carries into effect "the counsel of His own will," largely *through the medium* of finite agents whose freedom of will he never interferes with in the least. I know that it is sometimes said that if God not only foreknows exactly how men will choose and act, but "worketh *in* them both to will and to do," then men are not free agents, but irresponsible machines that God uses for accomplishing His own will. The fallacy of this idea is rendered obvious by the fact, that after Peter had denied Christ, and Judas had betrayed Him, each of them experienced the stings of an accusing conscience; each felt that he *had chosen* to do an inexcusable and criminal act, and was, therefore, answerable: and yet each of those men had been told, in advance, just what Jesus foreknew he would do—the one that he would thrice deny his Divine Master, the other that he would basely betray Him. Both the denial and the betrayal were foretold events; and their being foretold, and then coming to pass, proved that God always foreknew just what Peter and Judas would do: but if those men had not felt that in their respective acts they were totally free and self-prompted, would the one have "wept bitterly," or the other have exclaimed, "I have sinned in that I have betrayed the innocent blood?" It is plain that their consciousness of freedom was not lessened in the least by their being told what sin they would each commit. So if God were to show each one of us, in advance, a little map or history of his future life and doings, the map would prove to be a perfectly accurate one; yet no one of us would be compelled to choose or act as God had foretold we would. Facts prove conclusively that God's knowing beforehand, and with absolute certainty, what finite actors will do, is entirely consistent with voluntariness in the actors themselves. God's being eternally certain that Judas would prove a devil and betray Jesus, had no constraining influence whatever on Judas. Had not his betrayal of Christ been a perfectly voluntary act, conscience could not have extorted from him the confession, "I have sinned." It is just as proper to say of that vile traitor, that He could have befriended Jesus instead of betraying Him, as it is to say of a rebellious child, that he could be an obedient one, if he *had a mind* to be; or, that if a liar *choose* to be veracious, he could be. To say that if God foreknew Christ's betrayal by Judas, the betrayer could by no possibility help doing that wicked deed, is a serious mistake. If it be a legitimate sequence of God's eternally foreknowing the act and its doer, that Judas *could not help* betraying Christ, then I am certain that that act of his was no sin, and will have no punishment. For it is self-evident that to punish one for what he could not possibly help or avoid, would be cruelly unjust; and I know that it is utterly impossible for God to be unjust. But Judas' remorseful confession, and the fact that of him Jesus said, "Good were it for that man, if he had never been born," are convincing proof that throughout life he was an unfettered, free agent, and that it was by an abuse of his freedom that he brought on himself that fearful malediction.

In conclusion, I have this only to say: If the Bible does not teach the doctrine I have been defending, I know not what it does teach, or what sentiment it can be successfully appealed to for support. For one, I am certain that He whom I worship knew from eternity my every thought, motive, desire, choice, and overt act, and that without His special interposition I, though free to choose, shall be lost. And to those brethren that cannot agree with me now, let me affectionately say, that if heaven becomes our final home, I feel assured that there your views on this great theme will fully accord with those that I now firmly hold and advocate.

SUBSTANTIALISM AND SPIRITUALISM.

No. 1.

BY CAPT. R. KELSO CARTER.

An article in the March MICROCOSM by the Rev. T. M. Griffith brings up again the fact that many intelligent people still believe that the shallow tricks of spirit mediums are really supernatural in their nature. The reverend gentleman alludes to Zöllner's Transcendental Physics, which he says "contains a most impartial and scholarly report of mysterious manifestations which he witnessed in Leipzig, in connection with Henry Slade, such as the tying of knots in cords, the two ends of which were hermetically (?) sealed; writing within double slates, locked together; the passage of coins through solid wood, leaving no trace of their passage, but hot with the vibration of their molecules; *these are scientific facts.* [Italics mine.] Prof. Zöllner explains them in the theory of a fourth dimension of space, known only to beings of another sphere." He then proceeds to liken them to the glimpse of another sphere obtained by the dying, &c.

Now, how long will it take people to drop this inconceivable credulity, and wait for facts. "These are scientific facts"! Language fails to express the contempt felt, by those who have really investigated the matter, for such charlatans as Henry Slade, Charles Foster and the rest. But let me present a few facts.

In the summer of 1878, I had the pleasure of attending a performance of legerdemain, or prestidigitation, in Egyptian Hall, London, given by the famous inventor of mysteries, Mr. Maskelyne. To his fertile genius is due the marvelous whist player, which, after years of exhibition, still defies the magicians themselves. Only a short time before my visit, Mr. Maskelyne had appeared in the courts of London, as the prosecutor against this same Henry Slade—the charge being that he was a miserable impostor and swindler.

Slade had astonished London by the double slate-writing alluded to above; but in open court Mr. Maskelyne showed just how it was done in every detail. Thus exposed as a fraud, Mr. Slade betook himself to the continent (I think I am right as to the succession of events, but that would not be material), and found new audiences there. Be-

fore long, his wonderful feats attracted the attention of the professors of Leipzig, and at their request he organized a series of entertainments or *seances*, at Zöllner's house I believe. *Henry Slade has personally described some of the wonders that there occurred to me*, not more than three months ago. I am, therefore, specially empowered or enabled to speak confidently of them. Not to digress, I should here state that Mr. Maskelyne, at the performance to which I allude, spoke of Slade's exposure and offered the bold challenge to explain and illustrate any possible wonder ever actually performed by any medium in any country. When the Boston orator, Rev. Joseph Cook, made his lamentable slide from grace into the mud of a partial acceptance of these "phenomena," I sent him a statement of some of the facts connected with Slade, and urged him, when he visited London, to call upon Maskelyne and obtain from him the light which he so sorely needed. It is to be hoped that he did so. If not, he can gain some information from this paper. A short time ago, Henry Slade was advertised to appear in Philadelphia, and, in company with a friend, I sought a *seance*. My friend, Prof. Powell of this academy, is an adept in all the tricks of legerdemain; and I have gained a knowledge of nearly all known to the modern stage, so we were doubly armed and equipped for the meeting. Mr. Slade was exquisitely polite and at his ease. We sat down at once; and while he talked glibly and easily of the wonders of spiritualism, he took up the famous slates for the very experiment which has been called a "scientific fact." A week after we visited him again, when he so far forgot the cardinal rules of magic, as to actually repeat this and several other "phenomena," thus giving us a splendid opportunity to study the action of the spirits. The *modus operandi* appeared to be as follows: We examined the slates—nothing on them. A small piece of pencil was placed between them, and, without leaving our sight for an instant, the closed slates were held under Prof. Powell's nose, when the sound of writing was heard, interrupted every time Slade "broke the connection" between our hands on the table (one of his hands held the slates), and on handing the slates to Prof. P., he opened them and found one covered with writing on the general subject of spiritualism, and signed by some ghost unknown to us. This with slight variations is the famous writing between slates, where manifestly no man's hand could possibly do the work, as it is done in full daylight and right under your eyes. Now we are both ready to make oath that we *saw* just how it was done. Slade had behind him a little shelf, on which lay a number of common school slates. The first time he did the trick he began by handing us one of the slates for examination. Of course we found nothing on it. While we were examining this, he picked up another, apparently like the first, and turned it over *showing us both sides* of it, but did not let it go out of his hands. He placed it on the table, then deposited a minute piece of slate-pencil upon it and proceeded to lay the slate we had examined down on top of all. He then picked up the two together and passed them *partly* under the table, "to see if the spirits would write anything." They promptly signified their intention of so doing by a scratching sound, similar to that made by a pencil, whereupon he once more placed the slates on the table with slate number one uppermost as before, lifted 1 off, took out the piece of pencil, selected a "better piece," laid 1 on the table, put the pencil on it, and placed 2 on top, keeping the same side of 2 uppermost all the time. Now he was all right, and at once held the slates under Prof. Powell's chin; when the scratching began and the operation continued as first described. The secret was in slate number 2. This slate had the "message" already written on one side, long before we went to the room. Over this was placed a neatly fitting piece of slated card board of the precise appearance of the other side. When he first picked up 2, he easily held this cover tight against the slate and thus turned it, showing us both sides, and even wetting his finger and rubbing on both sides to make us certain that there was no writing there. He then placed this covered side of 2 down upon the table, and after putting the piece of pencil and No. 1 upon it, he carried them, as described, partly under the table, where the simple removal of his finger allowed the false cover to drop upon his lap, unseen by us of course as the table hid the lower portion of his body from view. When he put them on the table again and placed 1 on the table, the pencil in it, and 2 on top; this brought the lower side of 2, on which was the writing, *between the slates, where it was wanted.* All was now serene, and picking them up, fast closed together, a simple turn of his right wrist brough No. 1 on top, and No. 2 beneath, for it would appear most reasonable you see that the lower slate should receive the writing; and holding them against my friend's chest so that his fingers were under the slates and concealed by them, he made the scratching sound with his little finger nail; which part of the performance needs so little practise that I can do it quite as well as he.

This is the slate-writing in its most astonishing form. All that has been published about locks and screws, &c., is true enough; but manifestly these fastenings are not applied till the pencil has been placed between, when, it does not matter if the slates are surrounded by the imperial Russian guard, the work has been already done. Let it be borne in mind, that by the laws of the human mind which govern magicians in their sleight-of-hand work, it is absolutely impossible for any man to detect the trick as detailed above unless his eye has been trained to some extent in the working of such deceptions. The assumption, therefore, that Prof. Zöllner was a competent judge of the actions of Slade in Leipzig is precisely the loose screw in the argument. From the nature of the frauds practised upon that good man by the medium I readily conclude that his ignorance of legerdemain must have been absolute, and his perceptive faculties rather dull to say the least. The slate writing is not always done as above described. That method is only necessary when the victim is supposed to have sharp eyes. On the occasion of our second *seance*, Slade had evidently been so much impressed by our apparent gullibility, that he ventured to use the simpler method. Slate No. 2 was not shown on both sides. We looked at No. 1 which Slade took and laid behind him with the others while he did some trivial action, and then reaching behind him he picked up what he said was the same No. 1, but was really No. 2, and handed us No. 1 again, while he rubbed 2 on the top and made believe to rub it also on the back, taking care, however, that we did not see that side. We were supposed to believe that he was rubbing No. 1, which we had already seen; and therefore there was no need to put them even partly under the table. Our slate was put down, the pencil on it, and the supposed No. 1 laid on top with the concealed back down;

when he picked them up, put them on my friend's shoulder and proceeded as before. All the while he kept up an easy conversation, telling us of the wonders of his sittings in Leipzig, and remarking, with a candor of expression and air of innocent wonder that was simply exquisite,—"It was the most wonderful thing I ever saw in my life. I was frightened almost to death!"

Space is about exhausted, but we will give in another article, the particulars of the other tricks performed by Slade, and also of those of the famous Charles Foster, including the bloody letters on the arm, &c.; for we had the honor of a very satisfactory interview with the last named gentleman. He is now in an insane asylum, Zöllner is dead, and Slade—well Slade still goes round the country quietly and politely absorbing the money of credulous men and women.

CHESTER, PA., MIL. ACAD.

HOW PLANETS WERE FORMED.

BY REV. PROF. S. WOOD.

The nebular hypothesis of Laplace assumes that the planets were formed and their orbital motions imparted to them by the contraction of the sun's atmosphere, which was supposed to extend primarily, beyond the orbit of the most distant planet, caused by the heat of the sun; and, that the planets were left behind, from time to time, as the contraction of this atmosphere (by cooling) continued. This hypothesis is subject to several objections, either of which would be fatal.

Most of the objections bear equally against Kant's form of the hypothesis, which supposes that all the materials, comprising the spheres, that belong to our solar system, were, originally in their elementary condition, and filled the whole space of the system. This is the form of the hypothesis, as we generally understand. Both forms agree that the planets were formed by a contraction of the mass; the greatest contraction being in the region of the poles, with a projecting belt at the equator, due to axial motion. These belts or rings caused by the continued contraction of the mass, from the circumference toward the center, were separated from the body, but continued their axial motion, and by bursting into fragments, formed the planets: the axial motion of the rings becoming the orbital motion of the planets. The objections to this hypothesis, are: 1st. If the surface of the mass was contracting, as claimed, it was in the best possible condition to remain stable. 2nd. The centrifugal force of this diffused mass could not have been, by any known law of motion, sufficient, on its surface, at any point in its contraction, to overcome the force of gravity at that point. 3rd. The orbital motion of the planets is far too great to meet the demands of the theory.

4th. The planet Uranus and its satellites afford exceptions to the directional uniformity of the axial and orbital motions: the axial motion of the planet is retrograde, and the orbital planes of the satellites are nearly perpendicular to the ecliptic.

Stallo says: "But the most serious blow, which has lately been dealt to the nebular hypothesis, consists in the recent discovery (1877), by Prof. Asaph Hall, of two satellites of the planet Mars and the proximate determination of their respective distances from the primary, as well as their orbital, periods. It was found that the distances of the inner and outer satellites from the center of the planet are about three and six times, respectively, the radius of the planet, and that the periods of revolution of these satellites are 7 hours and 39 minutes and 30 hours and 15 minutes, respectively, while the period of rotation of the planet (Mars) itself is 24 hours and 37 minutes. It appeared, then, that one of the satellites revolves about the planet in less than one-third of the time required for the planet's axial motion." (Modern Physics, page 284.)

The hypothesis will not meet one of the conditions demanded of it. It does not account for the condition of the planets as we now see them, much less for their formation.

That form of the hypothesis, which supposes that all space was originally equally filled with this star-dust, which gradually separated into groups, and these groups into suns, planets, comets, etc., is still more defective; as all parts would be equally effected, and there could be no cause of motion, or change of motion, much less of separation. A nebular hypothesis that depends upon the contraction of its mass, by which the formation of the system commences on the periphery by its parts being left behind, must be utterly nugatory, as being contrary to all physical laws as now in operation.

Stallo says: "It is plain that the derivation of the forms and movements of the stellar and planetary systems from a primordial homogeneous mass uniformly diffused throughout space, is impossible." (Modern Physics, page 286.) We assume that all things and systems were formed from centers to circumferences, and not the reverse—as the nebular hypothesis demands. We also accept this canon: "*Quod sustinet vel delet, formavit.*" The planets were formed by that which now sustains them. We may learn the manner of their formation by studying the processes now going on. The sun and all the planets have rotary motion: this motion is the combination of the spiral motions belonging to the particles themselves, of which these bodies were composed. In the case of the sun which was first formed, these spiral particles came together by convolutions among themselves, by which the extreme spiral activities of the particles, which they derived from the living spiritual forces, by which they were formed, were brought together and compounded in the fiery vortex of the sun.

This physical sun is the first material effect in the system to which it belongs, and is therefore the highest form of material substance. It now becomes an active cause in the chain of causes by which creation proceeds: its activities, which appear to belong to itself are caused by the constant influx of the spiritual forces by which it was formed: that which formed it also sustains it. The sun now radiates its substance in all directions, (but principally from its equatorial regions), in active corpuscles which continue in staight lines but finally terminate or combine in a material substance upon a still lower plane. Gravity now takes control and these atoms begin to flow together and to return to the sun. But on account of the magnetic forces which these returning masses still retain, (though in a combined or changed form), becoming more positive as they approach the sun, they cannot rush into the body of the sun, but are driven off by its radiating corpuscles as the tail of a comet is driven off by the same force. In descending toward the sun, this accumulating mass had acquired a certain velocity by which it passed the sun and returned in the direction whence it came. These bodies are still accumulating in mass, not only by taking up the atoms which they meet in their course, but they attract other small bodies,

by which many are united into one, and return toward the sun in a very elliptical or excentric orbit. This excentricity becomes less, in a decreasing geometrical series at each revolution. This process has continued until the planets are as we now see them, and still continues: the meteors and aerolites, that are continually accumulating upon the surface of the earth is that part of the process that comes under our observation and is attested by experience.

The reason why the planets are within a few degrees of the sun's equator, is on account of the vortical forces of the sun by which a greater portion of radiating corpuscles, are in that direction, and are kept constantly within the power of this force. The comets are formed and are forming the same way; but those whose orbits are nearly perpendicular to the plane of the ecliptic, would accumulate very slowly, as they pass through a region of few aerolites.

A TELLING INDORSEMENT.

We copy the following article from the pen of Prof. C. H. Morris, A. M., as printed in the *North-West Missouri School Journal*, heartily indorsing our new departure on sound:

THE WAVE-THEORY OF SOUND MUST GO.

For more than 2,000 years, the phenomena of sound have been explained, as every student of natural philosophy knows, by assuming atmospheric vibrations, or vibrations of whatever medium through which sound may pass. This theory we have been taught; and, knowing no better one for the explanation of the various phenomena of sound, we have of course taught it to our pupils. Alas for human weakness, that quality in our nature that urges us on in the long-beaten paths, the time-honored highways that lead us to so-called scientific conclusions. These we follow, because some one before us has traveled them; because some great intellect has paved the way, and made it so much easier to commit his thoughts than to evolve better ones for ourselves.

I have in my possession a book, *Problem of Human Life*, written by A. Wilford Hall, of New York city, a review of which is intended in this article; and though we cannot notice but perhaps one of every score of arguments brought against the theories of the six greatest scientists of the day, yet we hope to notice such points as will be of interest to our readers, especially those who have made science a study. What we shall notice in particular is his arugments against the current theory of *sound;* and right here let me say that no adequate idea of the force of his arguments can be gotten from what is here given. I can only hope, by presenting a few of the most cogent reasons for abandoning the time-honored, and, in my candid opinion, fallacious theory, to set you to thinking as I have done, and to so interest you that you will procure the book, and read for yourselves, that you may judge for yourselves.

In the Preface of his book, Dr. Hall gives abundant reasons for assailing the Wave-Theory of *Sound*. One of these is, that if this theory can be shown to be false, and based entirely upon misapprehensions of Nature's simplest laws, these authors will be shown to be unreliable, and the so-called scientific theories of the day which oppose religious sentiment, notably that of evolution, will lose their power on the popular mind. It is plain, he argues (and it would appear so), that if the wave-theory of sound breaks down, so also must the undulatory theories of light and heat, as they are considered by scientists as analogous to sound.

Accordingly, he takes up the current-theory of sound, which should be well understood by every reader before undertaking to comprehend this most complete exposé of it; and by quoting copious examples from the works of its most popular advocates—Tyndall, Helmholtz, and Mayer—shows, beyond a doubt, to the mind of the reader who thinks deeply, that our text-books on sound, as well as our modern authors, are wrong in toto. My honest opinion, formed by twice carefully reading every line of that part of the book entitled, "*Evolution of Sound*," is that the students of our schools and colleges are being imposed upon to an extent inexcusable, by teaching them that sound is propagated by air-waves, or waves of whatever medium that conducts it. I am not an enthusiast, and what I say, in regard to this "Evolution of Sound," is after mature deliberation, and candid, truth-seeking study; and I disbelieve that any instructor in natural philosophy, who is competent to read and reason, can give the book a careful perusal, and afterward conscientiously instruct his classes in the current theory of sound. So exhaustive is the argument, so full of originality, so complete in its detail, so fair in the quotations from the authors he reviews, so strong, sometimes severe, in the language in which the argument is conducted, and so annihilating in the character of the attack, that one who thinks carefully and well, has but to read to be convinced of its great worth, the power of originality in the author, and the absolutely false premises and misapprehensions upon which the theory is based.

Professor Tyndall is held up to merited ridicule, though it would seem that he is more mercilessly treated at times than was really necessary to accomplish the object—to demonstrate his unreliability. This, however, may be accounted for by the fact that Professor Tyndall himself, as a controversialist, is very uncompromising and severe, as will be attested by all who have unfortunately fallen into his hands. Further, while he is by no means the ablest authority on sound (Professor Helmholtz, of Germany, and Professor Mayer, of our own country, being considered his superiors in originality and depth of thought), yet his great ability as a lecturer has called him to the rostrum as spokesman for these other authors, thus making him the exponent of the theory, and the proper target. His works on sound are indeed so popular as to have been translated into all the principal languages of Europe, Professor Helmholtz personally supervising the German translation. It is a well-known fact that there are no dissensions in the wave-theory household; hence the defeat of the ablest advocates must be the dissipation of the theory.

This is the idea of Dr. Hall; and, accordingly, he proceeds to quote from the voluminous works of these so-called scientists, arraying them against themselves and each other, until it would seem that there is not a foot of tenable scientific ground upon which to rest their case. So contradictory indeed are the statements of Professor Tyndall (no less than those of Helmholtz and Mayer), that one can hardly think it possible for them to have emanated from the same brain; and the reader finds himself silently accusing Dr. Hall of *interpolating* rather than *quoting* these eminent authorities, only to find, by reference to their works, and carefully

noting the connections, that their teachings are not only justly dealt with, but magnanimously.

We now propose to notice a few of the arguments:

1st. It is a well-known fact that if two strings or forks be tuned to exact unison, the sound of one will cause a sympathetic vibration and tone of the other, without there being any connection other than the air. This is explained, by the advocates of the undulatory theory, by asserting that the air-waves sent off by the actuating fork or string periodically dashing against the passive one, produce vibrations in it of a periodicity equal to that of the first body. They could not, of course give any other explanation consistent with their theory. One simple experiment is sufficient to show its fallacy. Tune two violin strings in perfect unison, remove them to a rigid piece of stone or iron, over which they are stretched. In this condition, there can be no audible tone produced by either of the strings by the most vigorous plucking. Now, while the air-waves, if any, are sent off from the string plucked just as they were when it was stretched across the sounding-board of the violin, yet the sympathetic vibrations of the other string do not occur. This shows clearly that it is not the air-waves that cause the vibrations of the other string. This one simple experiment, one that any of us can perform, shows the wave-hypothesis to be not the right one. Here is an extract from the author's explanation:

"I assume that there is a veritable sympathetic attraction in every sound-producing body for every other sound-producing body which has or may have a unison or syncronous vibration. The unison condition alone develops this sympathetic attraction into practical operation. As the analogue to this, there exists potentially in every iron body magnetic attraction for every other iron body. When a piece of iron is converted or *tuned* into steel, and assumes the character of a magnet, through the influence of electric currents, it may be said to be in unison with the molecular character of other iron bodies, causing an affinity to co-exist between them. Why it attracts another mass of iron, overcoming its inertia, and causing it to change positions when made to approach it, science does not tell us; yet it is absolutely certain that some kind of substantial currents pass off from the magnet to seize hold of the iron armature, or the corporeal result of lifting it could not occur, according to all known physical laws, since it would be an actual physical result caused by *nothing*."

Experiment shows that no matter how vigorous the vibration, if the actuating instrument be so circumstanced that no tone is produced, *no* sympathetic vibration takes place.

[The *Journal* contains other arguments copied from *The Problem;* but the above will serve as a specimen of the Professor's appreciation.]

ELECTRICITY THE MOTOR POWER OF THE SOLAR SYSTEM.—NO. XI.

BY B. T. KAVANAUGH, M. D., D. D.

DR. HALL'S OBJECTIONS AGAIN.

In the April number of THE MICROCOSM, the esteemed editor favors us with a few remarks in regard to my articles which, though in the main complimentary, yet show he has somewhat against us. As far as we can, in the brief space alloted us in this article, we will notice the objections in detail as they stand related to the great cardinal points of the theory.

The subject of Electricity as the great motor of the Solar System, is so vast in its magnitude and proportions that it requires many years of patient thought and investigation to comprehend its nature and the manifold forms of its action. It would be unreasonable to suppose that any mind, however gifted and enlightened, should comprehend at a glance the profound mysteries made plain by a proper study and development of its character.

The philosophic world labored for centuries to ascertain, if possible, by what great agent the systems of our Universe are regulated and controlled in their combined and co-ordinate actions and revolutions.

The FACTS of Astronomy as developed by Copernicus, Kepler, Galileo, Newton, and others, asset forth in the present system, are justly regarded as "established." In respect to these there is no controversy.

But when we go behind these phenomena, and inquire for the *cause* which gives to all parts of the Solar System their motions, which cause, from their harmonious regularity, must be regarded as a unit or one great physical force,—the main question to be determined is: What constitutes this one all-pervading force?

Sir Isaac Newton leads off with the answer that it is Universal Gravitation. This idea was suggested by the falling apple; and seizing upon the terrestrial force which holds the earth intact, and binds to it all material substances thereunto appertaining, by analogy he extended its application to the starry spheres, and upon a purely *speculative* philosophy, he has attempted to enthrone Universal Gravitation as the ruling force of the Universe.

Into this mistake, Sir Isaac Newton and his compeers were led by the fact that gravity was the greatest power *then known* in Nature. The Newtonian system was built upon this idea, and the learned world have accepted it in its entirety notwithstanding many parts of it are inharmonious with other parts, quoting the names of its great authors as absolute authority for all the positions assumed, and no further investigations made into Nature for further revelations

Sir Isaac Newton died in March, 1727, twenty-five years before the discovery by Dr. Franklin of the universal prevalence of Electricity, and yet up to the present day the Newtonian theory has not been modified to adjust it to this new and important discovery.

We live in a more progressive age where great names and hoary doctrines should lose sway over the public mind, when the theories promulged by them are contradicted by clearly-defined facts in Nature: and the true scientist should bow with homage and respect to the authority of TRUTH only, irrespective of the prestige of names, or the prejudices of education.

The Electric Theory whose rightful claim to the approval and acceptance of all honest and independent thinkers, I have humbly sought to set forth and vindicate in a brief outline view in these articles, assumes that gravitation is *not* a *universal* force, and hence that some other agent must be found to perform the functions hitherto ascribed to it, as such.

There are found in Nature three imponderable elements—light, heat, and electricity—over which gravitation has no influence whatever. These three elements proceed from the Sun, and are combined as a kind of trinity in unity in every solar ray

and act conjointly or separately as circumstances and exigencies demand, as shown in a former article.

One of these elements when considered in the endless diversity of its action, is found possessed of energies every way adequate to accomplish the great design of giving and sustaining motion in every member, whether solid or nebulous, of the solar system.

This element, Positive Electricity, is above and independent of gravitation, is infinite in the area of its action, its functions vastly diversified; hence we hold it is rightfully enthroned and crowned as God's great motor-monarch to control the movements and mutual relations of all parts of the material universe.

Having sufficiently set forth some of the great cardinal features of my theory, I will now briefly revert to the objections made by Dr. Hall in the article under consideration, and endeavor to answer them in detail. In doing so, space will not permit me to copy them all in full, but I request the reader to refer to the article itself in the April MICROCOSM.

Dr. Hall says, "So far as we are aware, electricity proper, whether positive or negative, does not pull or push any object in the slightest degree by passing from one object to another. We believe, in fact, that all the electricity that can be forced through a wire would not pull or push the weight of a feather between two objects thus connected."

In reply I state that there is a "push and pull" power, and in some instances a very destructive one in the passage of currents of electricity from the sun to the earth. For example (1.) the accumulation of electricity in the clouds in its passage to the earth in the form of lightning is a most fearful thing when it strikes a tall tree and shivers it to splinters. To protect houses from this terrific "push and pull," thousands of dollars are annually expended in lightning rods. (2.) When a low barometer, acting wholly by electric force, gathers up from ocean or lake vast volumes of water, carries it in defiance of gravitation into the upper atmosphere, and vaporizes it into clouds, there is a very considerable amount of "pushing and pulling" in the process. In either of these cases, if the Doctor's "feather" was in the way, we think we could move it.

We would remind the Doctor that in conducting electro-magnetism "through a wire" between two bodies, the magnetic current has a stronger affinity for the wire than for surrounding objects, and hence they are not affected by its passage, for magnetism passes *through* the body of the wire.

Not so with positive electricity, which acts on the surface only of solid bodies, and is continually flying off when surrounded by negative electricity. To demonstrate this if you lay a feather or any light substance on the prime conductor of an electric machine, and throw on a charge of positive electricity, it will be pushed from its position.

The Doctor alludes to the action of the magnetic needle and says "it was formerly supposed that it turned North and South because immense quantities of loadstone were located at the poles of the earth." Yes, even so; and this doctrine prevailed up to the time of the introdution of the Electric theory, and the subject would have remained obscure but for the light thereby thrown upon it; for there is nothing in the Newtonian system to relieve it.

The Doctor very well knows that if you approach the positive end of the needle with the positive point of a magnetic bar it will be instantly repelled; and if you reverse the end of the magne presenting the negative to the positive, it will b attracted with the same force. These well-know facts may serve a valuable purpose. Let this il lustrate the action of the sun upon the poles o the earth. When the Earth reaches its winte solstice, Dec. 22nd, it presents its negative pole t the positive Sun and there is a mutual attractio between them resulting from opposite electri conditions which brings the Earth to its perihelio or nearest point. From this time the South pol turns gradually away until after the vernal equino it sinks into shadow, and the North pole gradual emerges into the light; and as it is in like electri condition with the Sun, the Earth continues t recede until the 22nd of June, when it reaches it aphelion, which is five or six millions of mile more distant than at the opposite point of its orbit

Further, to show that the magnetic force of th Earth centers in the poles, we illustrate by th following example: Take a magnetized steel ba eight feet in length to represent the 8,000 mile of the Earth's polar diameter, rest it upon a cen tral stand and suspend across it at regular interval seventeen pairs of pith balls attached by thread a foot in length, when it will be perceived tha the balls nearer the polar ends will greatly repe each other, and the force of repulsion diminishe from either end to the central pair where it is im perceptible. This is the test of a delicate electrom eter, and clearly shows why the Earth, midwa between the poles, does not "attract iron any mor than wood or brass."

From this experiment is clearly deduced thi fact that all the direct magnetic force of the Eart manifests and centres in the poles. These form so to speak, hooks or handles by which the posi tive electricity of the Sun can lay hold of thes magnetic centres, and wield the globe in its cours both upon its axis and in its annual revolution Our theory, by no means, ignores magnetic attrac tion.

To further illustrate and demonstrate the "push ing and pulling" powers of positive and negativ electricity by currents passing through the atmos phere to the earth, we give the ebbs and flows o the tides under the electric action of the moon, a a case in point. According to our theory, whe the moon presents its dark or negative side to th earth as at new moon it "pulls" the waters of th ocean which are in a positive state, and "pushes those that are in a negative condition to the oppo site side of the earth, producing thereby, antipoda tides; in this case there is a revolving polarity es tablished in the waters.

I close these examples by insisting that th excentric flight of comets in their very elongate orbits is due to the pushing and pulling power o positive electricity proceeding directly from th Sun. The comet, which is a nebulous body (no solid as claimed by gravitationists), as it approache the sun in a negative condition passes rapidly clos around it for three-fifths of a circle, where it i powerfully charged throughout with positive elec tricity; and as positive repels positive it is repelle by the Sun to far distant space, whence it some times requires three hundred years to make it return. In accomplishing its extraordinary fligh it sets at defiance, and tramples under foot ever law prescribed for its action by the gravitatio theory, and strictly conforms to the known law of Electricity.

In regard to the casual remark, in a form number, that "the attraction of gravitation ma reach the moon," I spoke in doubtful terms; f

my mind is not clearly made up on that subject. As the earth and moon are both negative bodies, there is no great gravitating force between them; the difficulty seems to be to find an adequate propelling force to carry the moon forward in its orbit. As but little attention has been given to this subject heretofore, I reserve my opinion as to the laws that apply to it, until more light, and demonstrated facts, can be brought to bear upon it.

In every part of my theory, I repudiate the idea that the momentum given at their creation to revolving bodies was adequate to keep them in perpetual motion—annual and diurnal—through all time. Such an idea is unnatural, and cannot be sustained, when we consider that their pathway is surrounded and overshadowed by forces which, if unfriendly to their actions, are competent to retard or stop them; or, if friendly, to promote and continue them. In these forces, we find an adequate propelling power for each; and we are left to inquire, how do these affect the moon?

In closing these remarks (already protracted beyond my intention), I return to the editor profound thanks for the occasion afforded me to bring out before the readers of THE MICROCOSM some important features of my theory, not hitherto fully portrayed. I allude to the beautiful harmony presented throughout the electric theory, wherein is seen the workings of a two-fold, self-adjusting balance of power, which, at Dr. Hall's suggestion, I name "Push and Pull." Thanks for the suggestion. This pair of powers work beautifully together in all parts of the stupendous machinery of the universe. Like two celestial steeds, they career in the heavens, and carry forward, with admirable skill and dexterity, the various evolutions known to the sublime science of astronomy.

I derive peculiar gratification from witnessing the ease and elegance of their movements in overcoming every difficulty that has stood in the way of progress in former times, when our fathers in this science had harnessed up, and trained an inferior steed, which, upon a trial of his powers, proved to be blind, halt, and spavined, and wholly incapable of performing the dexterous feats so essential to success in his distinguished calling. The truth is, that a "one-horse" power, all "pull" and no "push," was a sad oversight in looking into the mechanism of the spheres.

We come to the relief of the clumsy, overburdened old steed of "Universal Gravitation," and propose to release him from duty in the upper spheres, and for the future give him repose in the home pasture taking care of terrestrial interests, while the fiery coursers of Electricity, *Pull* and *Push*, shall maintain their rightful position in the wide domain of Universal Nature.

MT. STERLING, KY.

REPLY TO DR. KAVANAUGH.

We would be very glad, if we could see clearly with Dr. Kavanaugh, and grasp the force of his positions on Electricity as the Motor-Power of the Solar System instead of gravity, as he so evidently and even sanguinely believes. Surely, one who has raised several objections to Newton's theory of gravitation, and urged them vigorously in THE MICROCOSM, as the reader knows we have done, would naturally welcome the efforts of a collaborator who could completely vindicate those objections by breaking down the entire theory of gravitation and substituting for it another motor. If we could really believe, by the most careful reading, which we have been able to give, of the Doctor's various articles on the subject, that he was probably correct in his general conclusions, we would be the first to hold up his hands and assist to harmonize the details of the new theory, rather than to raise objections, much less to publish them to the world. Or, if our objections bore only against some minor details of the new theory, we should consider it most unjust to urge them publicly, and thus tend to throw discouragement in the way of an earnest and conscientious investigator. But our objections lie against the cardinal principles of the theory,—not against any of its mere details,—as we will now try to show.

Is there, in the first place, outside of mere theory, any such distinction or things in Nature as *positive* and *negative electricity*—one to *push* a body, and the other to *pull* it? Such a state of things, in the absence of any fact within reach of human experiment or observation to prove it, is entirely incomprehensible to our mind. As well talk about our atmosphere as composed of a positive and negative air. Other substances may combine with air, and thus change its character; but that does not make two airs - one positive, and the other negative. So, other forces may combine with electricity, without changing electricity itself into either positive or negative substance. There is, of course, as everyone knows, a positive and negative, or *north* and *south* pole to a magnet. But magnetism is not electricity, in any sense of the term, whatever theorists may claim or argue. It is the product of electricity (as heat, light, or sound may be the product of gravity), and though a veritable substance, as truly as is the electric current itself, magnetism as the effect, is entirely distinct from the cause which produces it. This is not mere theory, or assertion. We have positive proof that their nature is entirely different, and need only refer to one characteristic, namely: that electricity must have a suitable conductor (unless greatly forced to jump), in order to travel, while magnetic rays need no conductor whatever. A bit of glass will stop the most powerful electric current, while magnetism passes through glass, or through a vacuum, as readily as through the best electric conductor. Many other points could be named, in which they are essentially different.

The *positive* and *negative* poles of a magnet are both produced by the same single and simple current of electricity (call it positive or negative, or what you will), passing around the bar of iron. If it be a steel bar, the magnetic state becomes permanent; and the north or south pole of the bar depends entirely upon which direction this single current traveled in passing around it. Let the electric current pass around the bar in one direction, and one end becomes the positive pole and the other the negative. Pass the current in the opposite direction, and the poles are reversed. But all this production and change of polarity in a magnet, remember, is accomplished by one and the self-same electric current, without any positive or negative about it.

Now, we insist, first of all, that these two distinctly different kinds of electricity—*positive* and *negative*—upon which the Doctor's theory rests as its chief corner-stone, be shown to have a practical existence. Ever since we can recollect, we have read and heard about this distinction, and about the positive clouds and the negative earth, or *vice versa*, according to each man's theory; and about the *positive* discharging its positive electric fluid into the *negative*, thus producing an equilibrium, &c., all of which has been totally unintelligible to our unscientific mind. We look upon electricity

as a single fluid, simple and pure, however generated, and have not the slightest conception of two electric fluids passing off from the same dynamo machine or chemical battery, and thus passing together through a conducting wire, the one kind (*positive*), traveling on the "surface," as Dr. Kavanaugh teaches, and the other kind (*negative*), traveling through the body of the wire. To our mind, this is so far-fetched and proofless, as at once to warrant its rejection, unless experimental evidence is forthcoming, which ought to be clearly accessible to science, if the doctrine be true. Yet this very assumption of the existence of two such different kinds of electricity forms the basis of the theory so long, persistently, and ably advocated in these columns. We object, also, to the doctor's manifestly incorrect use of scientific terms. He says:

"We would remind the Doctor that in conducting *electro-magnetism through a wire* between two bodies, the *magnetic current* has a stronger affinity for the wire than for surrounding objects, and hence they are not affected by its passage, for *magnetism passes through the body of the wire*," &c.

This confounding of "magnetism," "electro-magnetism," and "magnetic current," with *electricity* itself, is all wrong. "Magnetism" never travels along a wire, either on its surface or through its body, but is confined to the poles of the magnet, or their immediate vicinity. *Electricity* is clearly what is meant in the above quotation, and not "electro-magnetism." Let us, first of all, have clear definitions of the words we use, and then get at the facts.

The Doctor thinks there is a good deal of "push" caused by the electric current when lightning strikes a tree, and shatters it to splinters. The action, however, though greatly inexplicable for the present, is not that of a downward push at all, but is clearly a disintegration of fiber, and a repulsion in all directions. We doubt if a lightning-rod bears downward on the earth the additional weight of an ounce in consequence of a lightning-bolt striking it. This, however, can be easily tested by experiment, as we suggested in our April article. If enormous positive lightning bolts were constantly passing from the sun to the earth, and equally enormous negative bolts returning from the earth to the sun, accompanied by correspondingly prodigous thunder-claps, we might see the appropriateness of this lightning illustration, and might see some ground for discarding gravity as the motor-power of the solar-system. But with no evidence of such or analogous operation taking place, we see not how electricity acts any such dynamic part as our excellent contributor claims for it in pushing or pulling planets through space. We do not even begin to know that the electricity in a thunder-cloud comes from the sun, as the Doctor's theory requires. It is simply guesswork. It is much more reasonable to suppose that the atmosphere is already charged with it, and that the cloud collects and becomes surcharged with the fluid, till it is conducted off by the moisture in the air to the earth in the shape of lightning. This is all the "*positive* and *negative*" there is about it.

We come, now, to the two central,—and, to us, unanswerable,—difficulties against the doctor's theory. 1. The limited sphere of the *push* or *pull* of the most powerful magnet ever made must preclude the possibility of supposing that the sun and earth repel and attract each other as two magnets. This the Doctor distinctly conceded, owing to the enormous distance between the sun and the earth, and the short range of action in all known magnets. But he does refer to electric attraction and repulsion, in which bits of paper or pith balls are lifted or driven about by an electric current passing through a wire, and thinks this action is what constitutes the "motor-power of the solar-system." This, however, in our judgment, is worse than magnetism for the theory; for the distance through which any such electric action has ever been observed to take place, does not compare to the distance through which powerful magnets will act and pull at iron. As the Doctor does not claim magnetism as his motor-power, for want of a sufficiently long range of pull and push, he must also, it would seem, abandon electric action for the same reason; unless he can show a longer range of pull than was ever yet observed in the displacement of tiny pith-balls or bits of paper. How strange it seems to us, with a force (gravity), acting every day in our sight, pulling bodies of all forms, sizes, and materials, from all terrestrial heights, and without any appreciable diminution of power; and while admitting this force to extend to unknown distances, that a scientist should discard such a motor-power as of minor consequence for one as trifling as that observed in electric or magnetic action, and then insist upon the latter as the "motor-power of the solar system"!

2. But the most serious of all difficulties, however, in the way of the electrical theory, is the one to which we alluded in our April reply, and to which the Doctor adverts in his answer, namely: that the *moon* is actually carried around the earth and kept in its elliptical orbit by the action of gravity, and without any aid from electricity, precisely as the earth is carried around the sun in a similar orbit. Now, by going over Dr. Kavanaugh's series of articles in THE MICROCOSM, it will be seen that the earth, as relates to the moon, ought to be a great fountain of *positive electricity*, and ought to pour it off in mighty torrents upon the moon, in order to influence it electrically, and thus keep it in its orbit; for such is the fact with the sun, and such is precisely the way, according to the Doctor's theory, in which the sun keeps the earth in its orbit. Now, this very fact, unless it is fairly met, breaks down the electrical hypothesis, for the Doctor, throughout his argument, makes the earth the negative recipient of positive electricity from the sun; and hence, the earth is the exact opposite of such supply-fountain as he describes the sun to be. He further declares, in his answer printed herewith, that both earth and moon are "negative bodies," *thus precluding any such motor supply coming from the earth as is needed to drive or pull the moon in its orbit.* He further adds, that his mind is not "clearly made up on that subject;" that is, as to what keeps the moon in its orbit, though he supposed it might be gravitation, as he states in a former article. But here, plainly, *it must be gravitation, and nothing else*, since electricity can have no hand in the matter, taking his entire description of the manner in which electricity is supplied by the *positive* sun to the *negative* earth, and taking into view the fact that both earth and moon are helpless "negative bodies."

In all kindness and sincerity, therefore, we suggest to the Doctor to begin his theory anew, and to confine his investigations exclusively to the "negative" earth and moon, and first settle the question as to the possible or impossible application of this electric-motor theory to our nearer neighbor. If he shall find that *gravity* really keeps the moon in its orbit, and that electricity has no active part in the matter, as we feel sure he will, he may

then safely, honorably, and publicly abandon the electric theory as the mistaken motor-power of the solar system; since, plainly, whatever will suffice for keeping a satellite in an elliptical orbit around a planet, will be all-sufficient, in all reason, for keeping a planet in a similar orbit around the sun

We will print Dr. Kavanaugh's reply to this criticism in the August number, which will be the first number of Vol. III; and we must expressly insist that the Doctor first attend to the *moon* as the formidable difficulty in the way of his theory. Let him tell how the "negative" moon is kept in its orbit by the electric motor-power derived from the "negative" earth without any "positive" supply-fountain of electricity, before trying to explain how the earth gets around the sun. After showing and admitting, as he doubtless will, that the moon's motion around the earth can be caused only by the combined action of gravity and projectile force, let him then show some satisfactory reason why the Author of Nature ordained two separate and distinct motor-powers for the different members of one solar system.

KEPLER'S THIRD LAW AND GRAVITY.

BY PROF. T. F. MC'BEATH, A. B.

If Kepler's Third Law is true, *the central force in orbital motion varies inversely as the square root of the distance;* that is, *unless the planets be supposed to move in a resisting medium the density of which varies inversely as the square of the distance from the sun, we must conclude that* GRAVITY VARIES, NOT AS $\frac{1}{D2}$, BUT AS $\frac{1}{V\,D}$.

DEMONSTRATION.

Kepler's Third Law is that "*The squares of the times of revolution are as the cubes of the mean distances from the sun, or as the cubes of the major axes of the orbits.*" Or, representing time of revolution by t, and, distance from sun by D, we may express the law in the general form of a proportion thus:

$$t_2 : t'_2 :: D_3 : D'_3 \text{ (A.)}$$

But, since the *time* of any revolution is equal to the distance passed over divided by the velocity, we have. $t = \frac{\text{orbit}}{V}$, and $t' = \frac{(\text{orbit})'}{V'}$. Again, the orbit of a planet may be expressed in terms of its mean distance, radius; this gives us, orbit $= 2\pi$ R, or substituting D for R, we have $O = 2\pi D$. Now in equation $t = \frac{\text{orbit}}{V}$, for "Orbit," substitute its equivalent $2\pi D$, and we have

$$t = \frac{2\pi D}{V};\ t' = \frac{2\pi D}{V'}$$

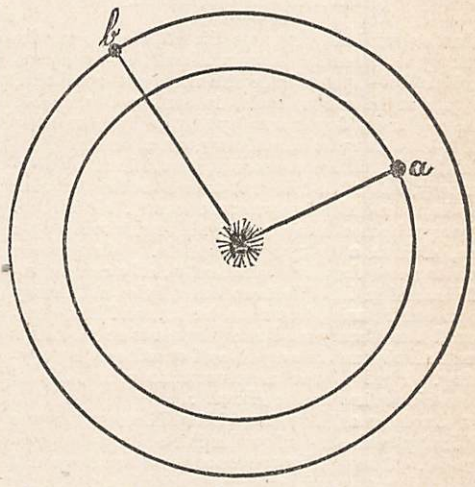
substituting these in the A proportion above we have $\left(\frac{2\pi D}{V}\right)^2 : \left(\frac{2\pi D'}{V'}\right)^2 :: D_3 : D'_3$ or, equating we have, $D'_3\left(\frac{2\pi D}{V}\right)^2 = D_3\left(\frac{2\pi D'}{V'}\right)^2$; whence, cancelling the common factors $4\pi^2$, D'_2, and D_2, we have $\frac{D'}{V2} = \frac{D}{V'_2}$; extracting the square root of each term, we have, $\frac{V\overline{D'}}{V} = \frac{V\overline{D}}{V'}$, or, in the form of a proportion $V : V' :: V\overline{D'} : V\overline{D}$. (B.) That is, *velocity varies inversely as the square root of the distance.* But now,

Since orbital motion is the result of the joint action of *two equal forces* the centrifugal, or *tangential* force, and centripetal, or *central* force, it follows as a matter of course, that these two forces being always *equal*, vary, each with the other, hence we write the formulæ.

Tg. f varies as Central f. (a) But, with a constant mass, any body moving in an unresisting medium, the force urging it forward must vary as the velocity; hence we have Tgf varies as V. (b) Now combining a and b, we have C f varies as velocity. (c) But again, with a constant mass, the CENTRAL FORCE VARIES AS GRAVITY, hence we have C f varies as gravity (d). Now combining c and d, we have, G. varies as V. (E), that is G: G': V : : V' (C.) Now combining B and C, we have G : G, : : $V\overline{D'}$: $V\overline{D}$. Q. E. D!

SECOND DEMONSTRATION.

In order to show clearly how inevetably Kepler's Third Law *drives* us to this conclusion, let us examine it in a different way.



Let a and b be two planets revolving around the sun, S, with mean distances—respectively, sa, and sb; velocities V and V'; masses, m and m'.

Now since these planets are supposed to be revolving in an unresisting medium, the force which urges each one forward will be equal to its planet's, mass into its velocity. That is, Tg. f = m v, and Tgf' = m' v'; or expressed proportionally, Tg. f : Tgf' : : mv : m'v' (1.) Now, Mr. Loomis, in his astronomy, page 135, sec. 251, says that Kepler's Third Law to be strictly true, must take into consideration the *mass* of the planets, and gives a proportion, thus modified which he styles "*rigorously* true." Now, since it can be shown that the *mass* of a planet, entering, as it dose, as a *factor* in both the *central and tangential* forces, *may be entirely ignored*, there is no *modification* to be made, nor could there be; but to save discussion upon this point here, we will adopt Mr. Loomis' "*rigorously* true" proportion, which is, $t_2 : t'_2 : : \left(\frac{D}{1+m}\right)^3 : \left(\frac{D'}{1+m'}\right)^3$. Now of our two planets, a and b, let us suppose them to have equal masses; then, since m becomes equal to m', the proportion reduces back to $t_2 : t'_2 : : D_3 : D'_3$ or as we have shown, it further reduces to

$V : V' :: \sqrt{D'} : \sqrt{D}$. (B.), or $V : V' :: \sqrt{sb} : \sqrt{sa}$. (2)

But now since the masses are equal proportion (1) reduces to $Tg\ f : Tg\ f' :: V : V'$ (3). Now combining (2) and (3), we have $V : V' :: \sqrt{sb} : \sqrt{sa}$ (4) But since the two masses a and b are equal the central force, *the* power that pulls each to the center S, will be in proportion to the power of *gravity* at each; that is, since the masses are equal, we will have, $C\ f : C\ f' :: G : G'$, (5). But since the tangential force varies as the central, we have $Tg\ f : Tg\ f' :: Cf : Cf'$, (6). Now combining (5) and (6), we have $Tg\ f : Tg\ f' :: G : G'$, (7). Now combining (7) and (3), we have, $V : V' :: G : G'$ (8). Lastly, combining (8) and (4), we have, $G : G' :: \sqrt{sb} : \sqrt{sa}$ (9). But, since sb, and sa, are the inverse distances of two planets, a and b, we have $G : G' :: \sqrt{D'} : \sqrt{D}$. Q. E. D.

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REPLY TO PROF. STRONG.—No. II.

[From *Zion's Herald*, Boston.]

In the previous paper we directed our remarks entirely to the one fundamental position—*tympanic vibration*—upon which the theory of acoustics, as taught in our schools, is confessedly based. The reader no doubt saw by that reply how little there is to support the theory, even in its citadel of defense. We now come at our critic in a different way, and with different weapons of attack; for this is not a defensive war on our part. It is Prof. Strong who needs to be defended against his own pen, if such a task were possible. We propose now to show that he has not only flatly contradicted himself in his efforts to defend the old theory from our attacks, but that he himself has abandoned the theory and overthrown it so far as his weak admissions are capable of overthrowing anything. Here is our unanswerable proof, copied from his review in the *Herald:*

"Another argument which will present some difficulty to the casual reader is based on the propagation of sound by waves of condensation and rarefaction through solids and liquids, *which the wave-theory assumes.* This author inquires how a weak insect can, by scratching on the end of a pine log, produce waves of condensation and rarefaction in the solid wood, much less in iron. Much might be said on this point. Much needs to be said concerning different kinds of elasticity, to make the point entirely plain. But the explanation of this phenomenon is by no means so difficult as it would at first appear. It will perhaps be sufficient to say here *that the action by which a sound is transmitted through any body—be it solid, liquid or gaseous—is molecular;* and, incomprehensible as it may appear to be in the case of solids and liquids, it is not more incomprehensible than every kind of molecular action with which we are acquainted."

Thus at a single stride has the wave-theory of sound been abandoned and given up! The critic here assumes, in order to meet the overwhelming difficulty of sound passing through other substances as well as air—such as wood, water, iron, etc.—that it cannot be wave-motion at all, but "molecular" action! In the commencement of the above extract he is compelled to admit that he is in direct conflict with the wave-theory in this "molecular" departure, because "the wave-theory assumes," he declares, that it is "by waves"; but I assume, says Prof, Strong, that the whole wave-theory is wrong because the action "is molecular"! And unwittingly, to be consistent, he changes the theory from wave-motion to "molecular" action even in air, by declaring "that the action by which sound is transmitted through any body, *be it solid, liquid or gaseous, is molecular*"! Was there ever such vandalism as this in an orthodox scientist? No advocate of the current theory of acoustics ever before intimated that sound traveled through air by "molecular" action, or by anything but air-waves, except some weakling whose incoherency could not keep him from falling to pieces while writing a single column. But here we see how easy it is for Prof. Strong to yield up the whole controversy, abandon the wave-theory, and actually come over to the doctrine of *Substantialism* just as we teach it in the book he so caustically attempts to review. "Molecular action" is admittedly the cause of the generation of all imponderable substances such as odor, electricity, magnetism, and, as we also distinctly teach, of light, heat, sound, etc. This will be found in our law of sound-generation as recorded at page 93 of *The Problem,* as we present it in opposition to the wave-theory. Guess our surprise, then, on seeing this would-be champion of the wave-theory forced to discard wave-motion and come over bodily to "molecular" action as the foundation law of our corpuscular theory!

But now to show the utterly incoherent character of the Professor's attempt at defending the old theory and opposing the new, look at his argument on tympanic vibration, in which he came out squarely for the bodily wave-motion of both the air and the ear-drum. There was none of this "molecular" dodge here! So strong was he for the wave-theory, and the superposition of different systems of waves in their beating against the tympanic membrane; and so firm was he for their resultant action upon this membrane in bending it "once in and once out as every sound-wave strikes it," as Prof. Tyndall expresses it, that he even goes to the trouble of explaining an experiment by which to demonstrate that it must be bodily wave-motion, and not "molecular" action—since the membrane in his illustration moves bodily out and in, causing a beam of light reflected from it to dance to and fro upon the wall! It is, of course, known even to beginners that the molecules of bodies cannot be seen, and that molecular action is invisible even under a powerful microscope. This, possibly, Prof. Strong has learned from the infallible text-books. Now, it is plain that he believed in the wave-theory when in that part of his criticisms; for he followed the doctrine to the letter, not only in the bodily waves of air striking the drumskin, but in the bodily undulations of the membrane itself as it bent out and in, as shown by the dancing of a ray of light from a similar membrane. But the moment he encounters the stunning difficulty of the observed passage of sound through iron "seventeen times swifter than through air," as all science teaches, with actual waves of iron (as demonstrated in the "Problem") eight hundred feet long, behold this profound professor of physics becomes a spontaneously generated convert to substantialism, drops wave-motion as if it had burnt his hand, notwithstanding "the wave-theory assumes" it in iron as well as in air, and hides himself under "molecular" action as definitely expressed in our own law of sound-generation elaborated all through the fifth and sixth chapters of the "*Problem of Human Life.*" No wonder he wanted to hide somewhere,

after catching a glimpse of these iron billows (caused by the singing of a katydid), hundreds of feet long, "from condensation to condensation," as the theory teaches of such sound-waves! We cannot, of course, do otherwise, in the plentitude of our human kindness, than magnanimously admit him into the fold of substantialism, as we do in the case of all professors who get their eyes open to the monstrous absurdities of the wave-theory.

But, seriously, we venture to assert, that a more pitiable, though unconscious, back-down and self-stultification, in a defender of a scientific theory, has never been recorded than here exhibited by Prof. Strong. Let him now either show the dancing of a beam of light upon the wall as the result of molecular action in a membrane, caused by the molecular action of the air (instead of air-waves), which he now claims to be the only true action producing sound in air as well as all other bodies, or else come out and confess, like an honest man and a true scientist, that the wave-theory has broken down under his own handling, and as an effect of his own "ignorance," "stupidity," and "charlatanism"—to use a specimen of his own classic epithets.

From this brief answer, it can readily be seen what unavoidable involvement the wave-theory encounters, even in the hands of its best defenders, if they dare to go seriously into its defense against the attacks of the "*Problem.*" We have repeatedly asserted in THE MICROCOSM that it is not possible for the ablest advocate of the theory to write a single newspaper column in its defense without contradicting both himself and the text-books. The reason is, because the theory is inherently self-contradictory. If one part of it seems to suit wave-motion, another part is of necessity molecular, and must involve substantial pulses analogous to those of electricity. Physicists built the theory originally upon the superficial observation of the incidental air-waves sent off by the sounding instrument, took these waves to be the veritable sound-pulses, and never, even by accident, succeeded in exposing its absurdity, as has Prof. Strong, by stumbling upon iron waves eight hundred feet long, from "condensation to condensation," caused by holding the stem of a tuning-fork against the mass of iron. No wonder they are inevitably forced into self-contradictions at every turn of a paragraph while trying to defend such a monstrous system of scientific incongruity. If some leading professor of physics can be put forward, and indorsed by our colleges, to defend the wave-theory, in a series of monthly papers, we will only be too glad to print them in THE MICROCOSM, and prove the truth of our published prediction, by showing that it is scientifically impossible to defend the theory without causing the different parts to clash and produce self-disintegration.

Now, it is no relief to the wave-theory, if a smart professor can, by long search through the "*Problem,*" find here and there a slip of the pen, or an inadvertent statement concerning some of the numerous matters introduced and discussed. It must be recollected that the current theory of acoustics has been formulated and discussed by the ablest scientists of the world for hundreds of years; all of its parts have been, as claimed, demonstrated over and over; and hence, if true, science should have no self-contradictions, or even discrepancies, much less such incoherencies as those we have just pointed out as having been unwittingly confessed by Prof. Strong. But it is very different with our treatise against the theory. It is the first word ever written against it. We had nothing to guide us; no book to consult; not even the education or experience of a physicist, at the time, to aid us; nor any friend to counsel who would give us the slightest encouragement; but, on the contrary, every friend who knew of our contemplated attack of the theory, either laughed at our presumption, or in pity expressed doubts of our sanity. Is it to be wondered at that minor errors (which we do not deny), should have occurred in the discussion of some of the details of our book, written as it was very hurriedly? Is it not rather a matter of wonder that more, and even fundamental, errors cannot be detected under the circumstances? Yet professors of physics, who profess to be anxious for the truth, and nothing but the truth in science, will pounce upon a slip of the pen, or inadvertent expression, as a sufficient excuse for ignoring a score of unanswerable arguments against the theory, and as a pitiable reason for still teaching that sound, passing through a tin tube, will blow out a candle; that two sounds will destroy each other, and produce silence in consequence of being produced a certain distance apart; and that the sound of an exploding magazine will not only break windows at a distance, but of course destroy buildings and kill men and animals nearer to its source! Thank heaven, there are hundreds of professors of science who are not so much looking for a wrong word or inadvertent phrase, upon which to fasten a quibble, and by which to bolster a false theory, as they are to determine the truth or falsity of the fundamental principles involved in a treatise upon, or a claimed discovery in, science! These honest investigators and true scientists are coming to the standard of the "*Problem,*" and entering their names upon the roll of substantialism, any one of whom is worth an army of such carpers as the one we now dismiss.

A. WILFORD HALL.

THE REFORMED MESSENGER.

In the May number of THE MICROCOSM, we indicated the probability of a reply to an article which appeared in the *Messenger*, from the pen of one of its editors, signed "K.," criticising our article, in the February number of this magazine, on the subject of Prayer-cure. We have more recently received quite a number of additional communications, from different Reformed clergymen, dissenting from the views expressed in that attempted criticism. We have not room to print all that "K"'s brethren have to say to us about his censorial sagacity. If he will call at this office, we will convince him, from our files of letters, that *such* a prophet has but little honor among his own people. A specimen letter is selected from among the many, and herewith printed, to show the character of our critic's conduct in the estimation of those who know him best. At present, we shall make no reply to his production, but submit it, together with the following excellent letter from a Reformed minister, to the tender mercies and righteous judgment of our intelligent readers. We withhold the writer's name and address for the present:—

THE PRAYER TEST AGAIN

(From the *Reformed Messenger.*)

It will be remembered that the eminent scientist, Prof. Tyndall, proposed, a few years ago, to test the efficacy of prayer for the recovery of the sick. Nor can it be forgotten how Christian sentiment was shocked by such an atheistic challenge. We had no idea that a similar proposition would ever be made from a professedly *Christian* standpoint, and that too by one who seems to be devoting all his energies in championing and defending the cause of revealed religion against the attacks of modern infidelity. But it is even so—one of Tyndall's most uncompromising antagonists has imitated him in this respect so closely that the one might be easily taken for the other, so far as this matter is concerned.

The publication in which Tyndall's prayer test is copied and proposed is the "MICROCOSM," a monthly scientifico-religious journal; and the writer of the article in question is the editor, A. Wilford Hall. This publication and the book written by Mr. Hall against Tyndall and others of his class, are regarded by many as having reached the *Ultima Thule* of scientific wisdom; and their expressions of admiration for the man and his work exceed everything of the kind that has ever attracted our notice; in some instances, amounting to nothing less than idolatry itself. According to some, God has come down again, as on Sinai, and spoken to this new Moses, whom He has appointed His special servant to enlighten the minds of men and break down the strongholds of infidel science. He has succeeded in gathering about himself a body of disciples and followers who exceed in devotion to their leader any other school of which we ever heard, in ancient or modern times. These adoring disciples believe their master to be as fully inspired as the most eminent prophet or apostle, if their words and ascriptions of praise mean anything. But what do they say to this? Or, are they so infatuated in their love that they cannot distinguish truth from error in their master?

In the February number of the "MICROCOSM," the editor criticises the accounts of miraculous prayer-cure published of late years by certain religious enthusiasts. All well enough; his criticisms seem to be fair and just; but now, behold! he goes right over and joins hands with the enemies of revealed religion, so far as to admit that such a prayer test as Tyndall once proposed is fair and right, for he now issues a similar challenge to the prayer-cure men to test the truth of their doctrine. Here it is:

"If the many ministers who believe in this *new* departure in supernatural interposition, are positively certain that cases of actual prayer-cure have occurred which were not the result of natural or psychological influences, let them join with us in inaugurating a movement for a general convention to which all cases of incurable disease and deformity, including well-known cases of blindness, deafness, lameness, etc., shall be invited, for the purpose of absolute tests of this doctrine, and we will send the announcement of such convocation broadcast all over the land through the columns of THE MICROCOSM. Nay, more, we pledge ourself to be present at such assembly to join with all believers in praying to God, with all the fervor and faith we can muster for the successful result of such a most desirable test. The experiment here suggested cannot be objectionable to the mind of God, nor distasteful to good men, as its aim and object can only be the greatest possible good of the human race."

Comment is unnecessary. Mr. Hall is a believer in Christianity, and is very demonstrative in its defence; but it is most evident, from the above extract, that he is a very unsafe expounder of its principles. In his book he makes an equally poor hand in Christian theology in regard to the humanity, or flesh, of Christ. He gives out the grossest ideas imaginable for scientific truth; and if his physical science is as crooked as his theology, there are more hoodwinked people just now than have been common. At any rate, we most solemnly protest against such flippant talk about prayer to the Most High, and the worshipping of the man who can thus talk. K.

———————May 15th, 1883.

A. WILFORD HALL:

My Dear Brother:—I am constrained, by an irresistible sense of duty, to write you a few lines. You are a stranger to me, except as I know something of you through your writings. I first became acquainted with your somewhat remarkable book,—*The Problem of Human Life*,—through a notice of the same, as it appeared last summer in our *Church Review*, *The Reformed Quarterly*. I have more recently examined the work for myself, and find it such a source of edification and pleasure as to congratulate you upon the valuable service you are rendering in the common cause of religion and true science. I cannot at present indorse all the views you seem to hold upon the several subjects now receiving such vigorous treatment at your hands, although I admire in you the confidence which springs from deep conviction, as well as the courage which becomes an honest man. I am willing to acquaint myself with your new teachings, before I proceed to condemn any fundamental feature of your philosphy; and, should I, in my examination of your work, find some declaration in obvious conflict with what I hold to be an essential principle of true science, I would feel myself bound, both by justice and charity, to withhold an expression of unfavorable judgment until I shall have become quite certain that the general tenor of your reasoning is not in the direction of the truth. This much is due you, in common courtesy. In my opinion, no man has a right to constitute himself a critic for the purpose of advertising his vanity by the prostitution of the public press. Much less is a Christian minister justified in venting his spleen, by stupid attacks, upon one whose manifest purpose is to institute a legitimate and radical search after the deep things of God.

I am sorry that there are some clergymen who do not share with me in holding sentiments so evidently in harmony with the first principles of the Christian religion. Oh for a more expansive range of that charity which does not behave itself unseemly! Let its channel deepen and widen in the direction of Winchester, Va. The *Reformed Messenger* contains an article which seems to be animated by a different spirit, and governed by a different code of ethics; and the only satisfactory way to account for its appearance in that otherwise Christian journal, is the fact that the author recently published a labored article, setting forth and commending the virtues of Cicero as worthy of a place in the circle of Christian graces. I see, in the May number of THE MICROCOSM, that your attention had been called to the article, and that you intended to reply to the same. Now the object of this letter is to reason with you upon the propriety of doing no such thing. The arguments

which I propose to submit are severally as follows:

"K." is a ministerial brother of mine, and a member of the same denominational household of faith. As such, he is entitled to my protection from the merited rebuke which you might, in justice, administer. You will agree with me that, "an eye for an eye and a tooth for a tooth," is no part of the Christian code. If you should conclude that truth would suffer by your silence, allow me to differ from you upon that point. "K."'s article contains but little truth to suffer, and just as little power to harm the conservative and scriptural truth of the editorial which he was presumptuous enough to attack. Let him write another article, while you remain quiet. Your position will not suffer—even though it should be exposed to a perpetuity of his presumption, and subjected to an eternity of your own silence.

Again, "K." is in the swaddling clothes of his editorial infancy, and should not be held strictly responsible for the blunders of inexperience. He will grow older, if he does not die in the critical period of cutting his wisdom teeth; and it is to be hoped that the indiscretions of youth will not be succeeded by the more intolerable follies of old age. In view of these facts, I hope that you will consider the tenderness of his years, and display the plentitude of your forbearance.

Further, you should remember that you stand charged with leading your disciples into idolatry; and that the accusation comes from one who can never be guilty of the crime alleged against yourself. It is not possible for "K.," by any amiableness of soul, or brilliancy of intellect, which he does not possess, to lead *his* followers (if he has any) into a violation of the first commandment. How jealous he is for the worship of the true God! He is the Tishbite under the juniper tree, while, in his narrow prejudice, the readers of THE MICROCOSM, including the seven thousand ministers of the Gospel who reject the abomination of Theistic Evolution, have all gone dancing the devil's hornpipe after the Baal of "Substantialism."

Finally, you need not be concerned about the theological soundness of your views upon the subject of prayer in behalf of the afflicted. Is the subaltern Editor of the *Messenger* such a gosling as not to know the difference between your announcement and that of Tyndallion infidelity? Out upon the mountain magnitude of such captious littleness! It is not wrong to test the extent of God's willingness to answer prayer in behalf of afflicted mortals (see Mal. iii:10); neither is it "crooked theology" to announce or suggest a general prayer-meeting for such a purpose. I suggest that you repeat the announcement, and enlarge the programme by including, as proper subjects of pious intercession, all such as may be afflicted with *mental myopy*. I would further suggest, that in "K."'s case, the convention follow out the apostolic injunction, and anoint him with oil. His case seems to call for extreme unction. The lubricant might at least serve to remove the rustiness of his intellectual joints.

AN OPEN REPLY TO AN OPEN LETTER.

[Printed in *The Investigator*.]

BY REV. A. V. MARSHALL.

MR. JAMES FOWLER, Schroon Lake, N. Y.:

Dear Friend and Neighbor:—Yours of January 28, printed in *The Investigator*, February 21, came to hand last evening, and I hasten to reply.

Years ago, I resolved not to take offence simply because my religious views were attacked, however dear those views may be to me. You and I have common interests in the correct solution of the problems of man, and his destiny. Therefore, in true friendship, we should together consider these problems. If, when we were boys, some unsuccessful teachers had read to us some of the problems of Zerah Colburn's Arithmetic, and told us that they had examined those problems, and found there were no answers to them, and that such and such problems were only insoluble puzzles, no doubt our unsophisticated childhood would have caused us to believe and confide in the teacher's false statements. But, fortunately, we were encouraged to believe that there was a reasonable solution for each problem, and we also found the solution of each problem, and gave our teachers a complete analysis of the same. In this simple school-exercise was laid the foundation which utterly spoiled *me* for Infidelity; for it gave me a habit of thinking for myself, and of solving problems, in spite of the doubts of unbelief, and regardless of ecclesiastical forms.

Now, in regard to the statements which you seem to suppose had reference to yourself, I will remark *first*, that, on the occasion to which I suppose you refer, I was speaking of a simple matter of fact, namely, that a large number of children in this place are growing up utterly destitute of all Christian knowledge and influence; and that these same children, under the strong influence of Infidelity, are being prejudiced against Christianity. In proof of my statement, I cited the teachings and questions which had been presented in public discourse in a store by a "gray haired veteran of Infidelity." I directed attention to the fact that children thus exposed to this one-sided influence would grow up to look with contempt upon that gospel which has always sought to lift man out of degradation, simply because the childish minds are unable to solve the problems which the veterans of Infidelity so constantly repeat in their childish ears. I then took those same teachings and questions, as they were repeated to me by an ear-witness, and analyzed them so thoroughly that the attentive Sabbath-school child of a dozen years, or the veteran of Infidelity, could not fail to see that the said teachings and questions did not militate against Christianity, but rather confirmed it.

My *second* remark is, that I did not then, and do not now, suppose you to be the "gray-haired man" whose speech I reviewed. Neither did I say or suppose that he "lived in this village," though his speech was delivered in one of the stores of this village. And, although well aware that there are several garrulous Infidels in and about the village, I have not supposed that *you* were much given to open opposition to Christianity, especially in these later years. I have no recollection of ever intimating that you held that "there is no God." If I ever knew your view on this point, I have entirely forgotten it. But I have understood that you felt a degree of doubt about the "immortality of man."

But, in your open letter to me, you remark: "I do not say there is no God, or that man is not immortal; for there are no facts to prove whether there is or not, nor any room but for vague inferences either for or against such a theory." And you state your creed thus: "I believe in the infinite wisdom of Nature—which is intuitive in the essence of matter and its immutable laws."

I suppose you know that this article of your faith is only a branch of a well-known system of materialistic philosophy which many have accepted

because they supposed it rested on scientific facts; but it turns out that those supposed scientific facts have no existence. Professors Helmholtz and Tyndall are among the leaders of that school of philosophy. They give us a description of an experiment by which *one* of that class of reliable physical facts could be demonstrated, even with a pair of penny whistles. But for more than a year, Mr Joseph Goodrich has publicly offered $5,000, as a cash prize, to anyone who will, by any means, demonstrate the truth of that which these professors teach for scientific fact so easily demonstrated. For three years, those professors have been urged to give a single demonstration of the pretended fact in question, according to their own teachings, and take the $5,000. Why don't they or their pupils accept the offer and apply the money on the Paine Memorial fund? The reason is manifest; the experiment they describe invariably demonstrates just the opposite of what these men have written in their books.

In my November and December communications to the *Essex Co. Republican* I gave proof of another error which those professors teach for a scientific fact. Dr. Wilford Hall, 23 Park Row, N. Y., offers through THE MICROCOSM to donate a ton of gunpowder towards helping forward experiments which will prove or disprove the teachings of those professors, and show whether that which they treat as science is true or a hoax. Those professors and all their friends are invited to be present and see that the experiment is fairly conducted. But sufficient observation has already been made to warrant the assertion that the pretended scientific facts as stated by Tyndall are not only false but an imposition upon the intelligence of mankind.

Another class of supposed scientific facts, set forward by Darwin, Huxley and Hæchel, on which your system of philosophy rests (if it rests on anything), namely, the transmutation of species, have been examined and found wanting. And of course, the foundation being removed, the superstructure reared thereon falls to ruin. For proofs in abundance that the very foundations of the evolution philosophy have crumbled, read the "*Problem of Human Life*," and series upon series of arguments now appearing in THE MICROCOSM.

* * * * * * * * * *

Yours, very truly,
A. V. MARSHALL.

[For want of room the remainder of this open letter is omitted.—EDITOR.]

"THE WATERS ABOVE THE FIRMAMENT;" OR THE EARTH'S ANNULAR SYSTEM.

BY PROF. J. N. VAIL, BARNESVILLE, OHIO.

The Editor of the "MICROCOSM" has kindly permitted me to advance for his readers some independent thoughts upon the Geological and Glacial problems.

I congratulate myself, that I am about to address a class of readers that walk without being led, and think with judgment unwarped by scholastic prejudice.

I condense from the "*Glacial Epochs and The Deluge*"—(a work under preparation for the press)—and propose to show in as brief a manner as possible that the earth was at one time surrounded by a complex system of rings and belts of aqueous and other matter, similar to the planets Jupiter and Saturn. That these fell to the earth successively throughout the geologic ages producing numerous and stupendous deluges, of which the Noachian flood was necessarily one.

That the fall of these tellurio-cosmic vapors necessarily began at the poles of the earth, whereas snow they produced all the Glaciel Epochs the world ever saw. That the waters of the existing oceans are but the remains of those mighty debacles of water, whose volume has been augmented again and again, by successive additions thereto, and whose downfall was competent to inaugurate each and every age of geologic time; competent to exterminate specific and generic forms, and bring in new conditions and plans of life, for higher orders; and competent, by the mere mechanical force of their immeasurable concussion, to so elevate the temperature of the earth's crust, as to terminate in continental upheavals and general submergences.

As I enter upon this momentous theme, I will ask the reader to note that I am impelled to these conclusions by the force of *philosophic law*. We will start with *known* data, and follow the operations of Nature as revealed to the eyes of all men.

We draw first from the "*Geologic Record*" the long established and all-admitted fact, that the earth was at one time in an *igneous-fluid* state. This being a conceded fact, another condition necessarily follows, viz: That all terrestrial waters, and whatever else of either mineral or metallic nature, that could be vaporized or sublimed by the inveterate heat of the molten mass, would rise from it and be held away by the repelling power of heat, forming a vast atmosphere of remarkable complexity. This, no one will deny; for, if it be not true, *then the molten world did not exist!*

The whole subject then is narrowed down to two important and vital questions: Those vapors and other associated matter returned to the earth either immediately after it cooled down, or, some portions of them remained and continued to revolve about it. Geologists, astronomers and physicists, all claim that those materials all fell to the earth in primitive times, and that the oceans that now roll around it are the same that washed the shores of the *Laurentian* world. The mighty fabric of Geology stands upon this foundation. *It shall be taken down;* its bottom stone upturned, relaid, and the superstructure reared anew; for I am sure there is no question in physical science more strongly supported by overwhelming evidence than the fact that the greatest part of the waters on the earth's surface revolved for ages immeasurable about it. Let us see:

Geologists, astronomers, and physicists generally claim that the great primitive atmosphere of the igneous world was at least 240,000 miles deep. If I admitted this enormous depth it would greatly assist me in my argument; but, that all men may see that I am treading entirely within philosophic bounds, and deal fairly with pre-established theories, I will assume that its depth was one-fourth that amount, or 60,000 miles. Again, astronomers claim that the primitive earth rotated once every four or five hours, which, if true, would simply compel annular formation; but I will here again decline to take advantage of the fact, and assume what every child knows, *i.e.*, that it rotated once in about twenty-four hours. Now these facts here assumed, no one will deny. If not true, there is no stability in physical laws.

The earth rotated once in at least 24 hours, with an atmosphere 60,000 miles deep. That atmosphere

rotated *with* the earth, just as its present atmosphere does. Its equator moved about 1,000 miles per hour, but the equatorial periphery of that great atmosphere moved about 16,000 miles per hour: like the rim of a great wheel moving sixteen times as fast as the hub, because both rotate in the same time. That is, a ton of matter rotating with the earth, on or near it, at the equator, had a moving energy, imparted to it by the rotating mass, equal to 1,000 tons; while a ton of matter, rotating with the earth at a height of 60,000 miles, had a moving energy imparted to it equal to 16,000 tons.

Anyone can readily see that the mass posssessing the greatest moving energy will be the last to fall inward upon the earth. Suppose the two bodies were revolving around the earth side by side at their respective rates; the body possessing the least momentum would loose the orbit of the other and fall first to the earth. The bodies would *separate;* the one moving the most rapidly would remain longest in its orbit. Here, then, is the innate tendency of an atmosphere of aqueous vapors to separate, the inner from the outer mass, as those vapors condensed and *occupied less space.* Thus necessarily involving annular formation. It would be improper for me to occupy space in these pages with the analytical formulas and calculations which prove the above. It must be plain to anyone, that the mass possessing 1,000 tons energy, has also a certain centrifugal force depending upon that energy. That force will be found, by calculation, to be about 6.3 lbs. five miles above the earth's surface. This force tends to continue the mass for a time in an orbit about the earth, and which it must give up before it falls to the ground. Now, it is evident, if it had a greater centrifugal force, it would require a greater length of time to part with it, and consequently it would continue longer in its orbit; while at the same time gravity, decreasing inversely as the distance would aid that detention; so that at a certain distance above the earth, a ton of matter of whatever kind in the primitive atmosphere rotating with the mass (once in every 24 hours), would possess a centrifugal force just equal to gravity, when if the vapor under it should condense and fall to the earth, the former would continue to revolve in equilibria. Now, if that ton of vapor had the slightest increment of centrifugal force above that of gravity, it could not fall until the substantial resistance of ether or other cause destroyed that increment and gave the advantage to gravity. Then, at the height of 40,000 miles above the earth, gravity becomes so much reduced that a ton will have a gravitating force of only 20 lbs., while its centrifugal force, when moving once around the earth in 24 hours, is equal to 34.3 lbs. That is, the force that *carries it away from the earth is 7-10 greater than the force that carries it toward it.* It is, therefore, a *demonstrated fact that the vapors of the primitive atmosphere and principal aqueous vapors had a velocity that kept them from falling!* The difference between 20 lbs. gravity and 34.3 lbs. centrifugal force, is 14.3 lbs.; and this is a veritable measure of the time required for ethereal resistence to turn the scale in favor of gravity. Not a pound of these vapors could descend to the earth while it possessed that greater force.

Hence, a great mass of aqueous vapors now forming the ocean, *remained revolving about the earth for unknown time, and which formed the earth's annular system.*

These deductions, examined by the searching eye of philosophy, will be found correct. Will the reader give God the credit, as he stands upon the threshhold of some of the most astounding revelations of modern times, as will be acknowledged in the near future?

But lest there be some readers unprepared to acknowledge the force of the above proof, I will double it, by an entirely different class of evidence, in my next article; as I propose to give my readers no chance to avoid the conclusion that the earth was attended for measureless ages by at least *one* ring of aqueous vapors. This, before I begin to open the geologic record.

SIMILIA, SIMILIBUS, CURANTUR, AGAIN.

REPLY TO DR. STUART.

Editor of THE MICROCOSM:

In the April number of your valuable journal, Dr. G. A. Stuart says: "The *regular* profession throughout the whole civilized world would challenge him, as they have challenged Hahnemann, and any of his disciples, to his proofs" (referring to the only true law of therapeutics, as discovered by Hahnemann). Isn't it rather late in the day to utter such stuff, even by a so-called regular, when they are every day stealing the remedies of homeopathy, as witness the lecture delivered recently at Bellevue College by Dr. A. A. Smith? Homeopathists are the only physicians who claim to administer medicine according to its well-known law of cure, and not even faith is needed to demonstrate its truth. Eld. Burroughs says he is convinced of its truth, as are many of the readers of THE MICROCOSM, especially in these parts; and we hope that even Patterson, Iowa, is not without its homeopaths. Fraternally,

UNIONTOWN, PA. A. P. BOWIE, M. D

ONLY ONE NUMBER MORE.

One issue more and this Second Volume makes its last monthly visit to its readers. Providence has been very kind to us in sending so many dear friends to hold up our hands as we battle for what we believe to be true science, true philosophy, and true religion. From all directions we hear but one universal verdict,—that THE MICROCOSM, as now issued, is not only a success but a necessity of the times. More than three thousand letters have reached this office since the first number of this volume appeared, saying, substantially: "*I cannot do without* THE MICROCOSM." We have no words with which to express our gratitude for the health and strength which have enabled us to labor almost night and day, and thus prosecute the good work. EDITOR.

DR. ROBERTS' SERIES OF PAPERS.

We announced last month that Dr. Roberts' excellent paper No. 3, on "Laws of Mind," was crowded over till the June issue of THE MICROCOSM, among other valuable articles. We then sent No. 3 back to the Doctor for abbreviation, in one particular, expecting it to be returned to us in time for this number; and it would have been, had not paper No. 4 been sent in its place. This made a hitch. We immediately wrote for No. 3, but did not receive it till too late for this number. It will be good, however, when it comes; and, these most important papers will go on regularly next month and thereafter.

WILFORD'S MICROCOSM.

23 Park Row, New York, June, 1883.

A. WILFORD HALL, Ph.D., Editor and Prop'r.

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SPECIAL NOTICE.

In our conduct of this journal we desire to give our list of excellent contributors the widest possible latitude for the conveyance of their honest convictions, so long, at least, as this liberty does not conflict with the general aim and scope of THE MICROCOSM. But we wish our readers definitely to understand that we do not hold ourself responsible for the views of our contributors, nor, in fact, even for our own views, as we are liable at any time to change ground on receiving more light, as we have done more than once since this paper was commenced. But, generally, we hope and aim to be consistent. EDITOR.

MR. BEECHER ON EVOLUTION.

We had the satisfaction recently of hearing Henry Ward Beecher deliver his celebrated lecture on man's development from the lower animals, entitled "Evolution and Revolution," and we now propose to give the reader our candid impression of him and his lecture. It had been some years since we had enjoyed the pleasure of hearing him, and our first impression on seeing him anew, as he rose to address the audience, was, that he had aged very rapidly within the last few years, and his appearance indicated anything but the sparkling, brilliant, vivacious and self-possessed orator that he once was. This impression was intensified before he had uttered a dozen sentences. We felt most impressively and oppressively that he was a woefully changed man, even more radically changed intellectually than physically. His sentences were mortifyingly common-place, vague, and pointless; while his ideas were even more shambling and sluggish than his utterances.

It was plain to be seen that in attempting his new scientific role, the once electric and fiery orator was entirely out of his element. He neither had at his command the well-known terminology of the doctrine he was essaying to grapple with, nor had he anything like a clear comprehension of the subject matter of the real questions involved in his lecture. It was clear, however, that he had made a recent effort to prepare himself for the task his assumed role had imposed upon him, and that by forced reading and partial study of Darwin's *Origin of Species*, and Haeckel's *Evolution of Man*, and *History of Creation*, he had committed to memory a few of their stale arguments and far-fetched explanations which he had hoped to make effective by aid of his own commanding eloquence and by dint of his own prestige and assurance. But a few minutes only, in witnessing his total want of coherency and of that grasp of the ingredients of the argument which were needed in order to bring conviction to a logical mind, must have painfully impressed even his best friends that his attempt on evolution was an inglorious failure. So strongly was this apparent bewilderment of the great speaker manifest upon the thinkers in his audience that gentlemen near us looked at one another with an unmistakable expression of uneasiness or even alarm, such as one feels for an embarrassed speaker at the point of breaking down in his discourse. This was the actual impression made upon us, and we can state in sober truth that so labored and oppressive was the effort to start anything like a chain of pertinent ideas or consecutive thoughts worthy of the occasion, we felt intuitively like helping him to such familiar terms as *Orohippus*, *moneron*, *ascidian*, *marsupial* and the like, which he seemed at times to be trying to call up but couldn't.

But this was not the worst phase of the effort.

It was clear from the start and all the way through that the speaker had read but one side of the question, and *that*, of course, the side favoring evolution. The commonest student of the doctrine of descent, who has tried at all to look at both sides of the questions involved, could see at a glance that Mr. Beecher had not even dreamt of any real or serious difficulties existing in the way of natural selection and survival of the fittest, and that he had not even the remotest thought that there is a book published and in circulation that effectually answers all the arguments he used, and scores of others that he did not even attempt to touch. Any one who was really acquainted with those answers to the evolution doctrine and their annihilating character must have felt a sense of sympathy for the lecturer bordering on commiseration.

But the worst feature of all, and that which made the lecture fall flattest upon the large and intelligent audience, was the self-manifest fact that Mr. Beecher was ashamed of himself and of the monstrous doctrine he was endeavoring to defend. He positively looked, at times, as if he would have been glad to crawl under the little table by his side and sink out of sight till he should wake up and find the whole thing a dream. So deeply was this sense of shame depicted on his face at times that even his few friends on the platform seemed to catch the infection and cast doleful looks at each other as if they wished they were at home and in bed. We did not have that feeling, however, as we wished to see it out, and witness the novel sight of monkeyism gone to seed in the person of the foremost Christian minister of the civilized world; and we saw it. And so painfully humiliating did the solemn farce appear to us that we could not have felt more lugubrious had we been at a funeral. The immense audience seemed to take the same view of the occasion, as not a clap nor a sign of applause greeted the speaker from beginning to end of his puerile and disjointed attempt to prove himself and his audience but a congregation of highly developed and carefully cultivated monkeys. About the only witty thing he said was: "I had just as lief [which he pronounced *liv*] come from the loins of a monkey as to be made of dirt and come from a *mud-hole*, wouldn't you?" One gentleman near us saw the point of the joke on Genesis, and showed his appreciation by curling his lip.

Mr. Beecher denied the inspiration of the Scriptures as having come from God in any real sense, or that the prophets or so-called inspired men were anything more than men a little smarter, more learned, or sagacious than the average of their fellows at that time; and that the writings of such men, embodying their impressions of the conditions of the race up to that period, constituted the inspiration of that age. Another age produced other men still more cultured and advanced. These gave in their writings a more advanced conception of the race morally, intellectually and socially. This constituted a still higher advance in inspiration, till Christ, the greatest of His race, came; and this brought the highest inspiration of all. But not one particle of evidence could be discovered in his argument, by the closest watching, that he believed Moses to be more inspired than was Darwin, if as much; that Jeremiah was any more of a prophet of God than was Sir Isaac Newton; or that Jesus of Nazareth was in any sense more intrinsically divine than was Martin Luther. We do not say that he taught this, in so many words; but we do say that the entire drift and meaning of all that portion of his lecture, conveyed just that impression and nothing less. The direct and necessary tendency of his entire reasoning was to disparage the divine authenticity of the Scriptures and the fundamental doctrines of orthodox theology, while the unavoidable effect, upon all who were not imperviously disgusted with his unparalleled apostacy, was to weaken faith in the Bible as anything but a compilation of poetic and allegorical compositions conveying but imperfect ideas of the earlier stages of human advancement from that barbarism which succeeded the ape dynasty. We solemnly asseverate our belief that one such lecture, coming from Mr. Beecher, trusted and revered as he has always been by so many, does more for the spread of infidelity and even atheism than any course of lectures Ingersoll ever delivered. Still he did not avow infidelity to the entire Scriptures except by denying essential parts, which, to a reasonable mind, is equivalent to denying all, and by innuendoes or ridicule thrown at the universally accepted views of the religious world, such, for example, as calling the different churches nothing but "insurance companies and fire-insurance at that, since their chief business is to protect people from the danger of loss by future hell-fire." These were his words as taken down at the time.

We are, therefore, compelled to believe, if he would honestly submit to be catechised, that he would avow his total disbelief in the Bible as any more an inspired volume than is the "*Pilgrim's Progress*," or any other good work. We regard him as totally apostatized from the Christian Religion, and that his continuance in the ministry of Plymouth church, with his present progressive (?) ideas, is the baldest exhibition of religious hypocrisy and the most solemn burlesque of sacred things that has been witnessed in a century.

The speaker closed his address by advising his hearers to read several books, which he named, favoring evolution; but we noticed that he did not tell them to read the "*Problem of Human Life.*"

He sat down without a vote of thanks, or one clap of approval; while his audience, as solemn as a convocation of their babboon relatives, looked at each other for a moment, and then, one by one, like so many Arabs, folded their tents and silently stole away.

SOUND-INTERFERENCE AND SILENCE.

(THE FINAL AND TEST-ARGUMENT.)

Since Mr. Joseph Goodrich made his offer in THE MICROCOSM of $5,000 to any one who would produce a genuine case of sound-interference and silence by sounding two unison instruments, according to the teachings of the wave-theory, we have received numerous letters from parties claiming to be able to produce such an instance and thereby to earn the prize offered. Most of those who write thus depend for their information, as to the possibility of such result, entirely upon the word of some professor of physics who, in turn, depends upon the authorities used in our schools without thinking of testing the truth of their statements by actual experiment. Let us try, by a few critical remarks and one final argument, to throw a little light upon this question.

Now, there are certain well-known effects of "opposition of phase," as it is termed, in two sounding bodies, such as that observed when "beats" occur in two strings a very little out of tune, causing alternate sinkings and swellings of the tone, which have been mistaken for the effect of this wave-theory law of interference. These phases of opposition, as we show in the "*Problem*," at page 302 and onward, have no sort of relation to the so-called interference taught in the *wave*-theory, as the result of coalescing air-waves, but are explicable entirely on the basis of substantial sonorous pulses.

Take the case of Prof. Tyndall's experiment with the *double-siren* as reviewed in the "*Problem*" at page 286 and onward. That distinguished physicist honestly thought he was producing a real case of sound interference as required by the wave-theory, namely, the bringing of the "rarefactions" of the air from the puffs of one disk of the siren into coalescence with the "condensations" of the air produced from the other disk. This, however, we showed to be a very superficial oversight, as any one having the "*Problem*" at hand can see by reading our criticisms. When the twelve holes in each of the two rotating disks were so adjusted that they puffed simultaneously, it was clear that each disk made the same fundamental tune, and that both, sounding in exact unison or synchronously, must make this double fundamental tone very much louder than if but one disk were sounding. But when one of the disks was so turned that its puffs came in half way between the puffs of the other disk, of course, a single revolution of the spindle to which both disks were fast, would make 24 single puffs instead of 12 double puffs as before. The effect of this was, as a matter of course, and as every musician knows, to raise the pitch of the tone to an exact octave above the fundamental, and in the only way such octave could be produced, which octave must necessarily be much weaker than the fundamental in consequence of the single puffs composing it. But, this most simple and obvious solution that greatest English-speaking scientist overlooked alone on account of the influence of the wave-theory upon his mind, and while actually admitting the presence of the "octave" tone, which his audience plainly heard, he still insisted upon "*silence*" as the result, *because the fundamental tone had ceased*, and because the wave-theory required "silence," according to its basic and baseless law of "interference"! Is it possible to conceive of a purer case of mental blindness caused by the over-mastering influence of a false theory!

But, there was another feature of this double-siren experiment as described in Prof. Tyndall's book, which clearly brings out the peculiar effect we at first made reference to, known as the "phase of opposition" observed in "beats." As he slowly kept changing the relation of the two disks toward each other, so that the twelve puffs of one disk would occur first simultaneously and then alternately with those of the other, there was, as he expresses it, an alternate sinking of the tone almost to silence; then a swelling to loudness as the two sets of puffs pulled away from sympathetic synchronism. This effect is exactly the same as "beats;" though, as we see, it has no resemblance to the so-called "interference" of the wave-theory.

This "law," as taught in the text-books on sound, is one of the simplest and plainest things taught for science,—so simple that the smallest child that goes to school can be made to comprehend it; and could, also, demonstrate it by experiment if it were true.

Now, since many young students read this magazine, judging from letters we receive from them asking questions on sound, let us once more make this so-called "law of interference" plain, and thus clearly show its fallacy. It teaches, in the first place, that any sound (such as the tone of a string) is constituted of a succession of air-waves sent off by the string's motion to and fro, one wave for each vibration of the string. The wave-theory tells us that each of these waves consists half of a "condensation" and half of a "rarefaction" of the air. That the length of such a wave depends upon the pitch of the tone, and the consequent number of waves that pass off in a

second. For example, the middle A-string of the piano makes, as actually demonstrated and counted, 440 vibrations in a second; hence, it sends off 440 air-waves. Now, as sound travels 1120 feet in a second it follows if we divide 1120 feet by 440 waves we have exactly 30½ inches as the wave-length of that pitch of tone, 15¼ inches being the length of the "condensation" or compressed part of the air-wave, and 15¼ inches being the "rarefaction" or expanded portion of the air-wave. This idea of sound consisting of air-waves composed of such a series of atmospheric "condensations and rarefactions" is taught in all works on acoustics. Here is a short extract from Prof. Tyndall's work on "*Heat as a Mode of Motion*," pages 225, 372:

"Figure clearly to your minds a harp-string vibrating to and fro; it advances, and causes the *particles of air* in front of it to *crowd together*, thus producing a *condensation of the air*. It retreats, and the *air-particles* behind it separate more widely, thus producing a *rarefaction of the air*. The string again advances, and produces a condensation as before; it again retreats, and produces a rarefaction. In this way the *air* through which the *sound* of the string is propagated is *moulded* into a regular sequence of *condensations* and *rarefactions*, which *travel* with a velocity of about 1100 feet a second. The *length of the wave* is measured from the *centre* of one condensation to the *centre* of the next one."

These condensations and rarefactions being simply air-waves, Prof. Tyndall, and all writers on sound, consistently compare them to water-waves in formulating this so-called law of interference. It is well known, if two equal systems of water-waves were started in such relation to each other, that the crests of one system would travel in the troughs or furrows of the other system, that the two systems would mutually destroy each other, producing a comparative level of the water-surface. This is practical wave-interference which nobody disputes, since here are real waves to deal with. Now, if there is any truth in the wave-theory of sound, it is plain that two systems of atmospheric condensations and rarefactions should interfere in the same manner and should produce *quiescence* of the air and consequent *silence*, since sound, according to the theory, consists only of such air-waves or atmospheric disturbances. If no such interference exists, and if no such consequent silence occurs, when two unison instruments are sounded together and at all possible distances apart so as to hit the half-wave-length required, it is proof positive that the law is fallacious as applied to sound, and that the theory, of which that very law is one of the foundation-pillars, is intrinsically a mistake, and should be at once abandoned.

To test the law, and to determine its absolute truth or falsity, we do not have to fabricate an experiment of our own, however well we might understand the problem to be settled. Prof. Tyndall, in his great text-book on sound,—a standard work, by the way, in all colleges,—has saved us that trouble. He describes an experiment, as performed in his lectures, with all its details, at pages 259, 260, in which he positively declares that the waves from two unison forks sounded *half a wave-length apart*, will neutralize each other in the line of the two forks, because the condensations from one fork will reach the other exactly in time to coalesce with its rarefactions, *thus producing quiescence of the air and consequent silence!* Suffice it to say in one word that a more glaring and inexcusable scientific misstatement of facts was never uttered or penned by man, as any one can determine by testing it. Not the slightest diminution in the intensity of sound will occur, whatever the instruments used, whatever the distance they may be sounded apart, or whatever the direction or angle at which they may be heard. This, of itself, annihilates the law of interference as formulated by the highest living authority on acoustics.

But, as a final and conclusive argument upon this subject,—one which even children can comprehend,—we will now show that if this law of "interference" be correct, *then no instrument can produce an audible sound, because every "condensation" it makes must neutralize itself by a simultaneous "rarefaction" sent off at the same instant and by the very same vibration which sends off the condensation!* There is no escape from this. Take, for example, the harp-string described by Prof. Tyndall, as just quoted. It *advances*, he says, and produces a *condensation* of the air; but this very *advance*, remember, is also a simultaneous *retreat* on the other side of the same string, producing, thereby, a *rarefaction*, and at the same instant. Now, as this rarefaction starts off in all directions simultaneously with the condensation and at the same velocity, the two must, therefore, travel together in each other's embrace, and in absolute self-neutralization just as the wave-theory requires in order to produce interference and silence! And, as each subsequent swing of the harp-chord must produce simultaneously both a condensation and rarefaction that start and travel together, it demonstrates to the utter confusion of wave-theorists that nothing but self-neutralization and atmospheric quiescence by continuous interference can be the product of the string's action; and, hence, that no sound at all should be heard in any direction if the theory be true! But, as sound is heard in all directions, notwithstanding this absolute interference of its air-waves, it proves that the law itself is a baseless sham, and that the theory which requires, teaches, and depends upon it for existence, does not come within telescopic range of scientific truth.

We thus settle the controversy with the advocates of the wave-theory, and offer this final argument as the test-case for those who are anxious to

obtain Mr. Goodrich's cash-prize. If they want that prize let them now answer this argument and show how any sound-wave can be heard at all according to the theory when it necessarily interferes with and neutralizes itself? What answer, suppose you, reader, will the ten thousand professors and teachers of physical science in the United States give, or try to give, when they come to read this argument? The columns of THE MICROCOSM are open to any regular college professor who will briefly, over his own signature, risk his reputation as a scientist by attempting to answer this argument and thus defend the wave-theory.

PROF. COMSTOCK ON GRAVITATION.

We have received a communication from Prof. Comstock in reply to our criticisms of his papers which he published in the Galesburg *Republican-Register*. But, as he still adheres strictly to his views as quoted from those two articles, in the April number, namely, that the moon does not pull or shove itself toward the earth at all in its attracting pull at the earth, it would seem to be a waste of space to copy his complex criticisms, which we assert no common reader can understand. We will simply reproduce his views as we quoted them in April, as follows:

"The *direct attraction* of the moon upon the earth overcomes the inertia of the earth, *and under the impulse the earth moves toward the moon*; it moves toward the moon because it is attracted in that direction by the moon; *and the moon does not move toward the earth under the action of this force, because there is no part of the moon's attraction for the earth, which acts towards the earth.*' * * * Mr. Hall's error consists in strangely confounding the motion of the earth, which is due to the attraction of the moon, with an imaginary motion of the moon toward the earth, through which '*the moon pulls itself toward the earth. But there is no such action of the moon*, as has been abundantly shown, and hence his whole scheme of assertions is without foundation."

From these quotations, if true, it follows irresistibly that neither the moon nor the earth pulls or shoves itself in any degree toward the other by attracting the other toward itself. Hence, it is all folly in claiming to teach the principle of *reaction*. There is no "reaction," nor can there be in the premises. How can the moon's pull at the earth react upon itself if its pull is all exerted upon the earth, and if it does not tend thereby to pull or shove itself toward the earth? All the algebra and confused mathematical symbols in Christendom cannot prove that the writer who wrote the foregoing quotations believes in *reaction*, in any true sense of that term. Yet, Prof. Comstock, by a series of complex statements and "schemes," as he calls them, actually tries in his communication to make out that the passages quoted above agree exactly with Capt. Carter's deductions from Newton's fundamental principle of gravity, namely, that one half of the fall of the moon or of a pebble is due to the earth's attraction of it, and that the other half is due to reaction or to its own attraction of the earth! With such preposterous and self-contradictory scientific claims as this, what is the use of argument? If it is not absolute self-contradiction, then such thing is not possible in human language.

But Prof. Comstock, impressed with our illustration of the floating magnet pulling itself by reaction toward the piece of soft iron, felt that something must be done to break its force, or his anti-reaction theory in the case of the moon's attraction would break down of its own defects. So he takes a position which he evidently thinks is new, but which can be found in Newton's "*Principia*," at page 302 and elsewhere. Let us now consider, briefly, this last attempt to aid the position of Prof. Gray. He says:

"In conclusion I would say that Mr. Hall would confer a very great favor, if he were to send me a small piece of that *soft iron* which is *attracted by, but does not attract, a steel magnet.* In all my experiments, *soft iron is converted into a magnet by induction before it is attracted; and then it attracts the inducing magnet.*"

No wonder that the Professor has fallen an easy victim to this superficial fallacy, when Newton so authoritatively lays it down as true science. But what child cannot see, after it has been suggested, that while the piece of soft iron may, from its magnetization by the steel magnet, appear to attract other adjacent bits of iron, it would be a gross absurdity to say that this magnetism which it obtains exclusively from the magnet, helps, in turn, to pull said magnet toward the soft iron!

If Prof. Comstock were correct in supposing that the magnetism which the soft iron receives alone from the steel magnet enables it to react upon the magnet, thereby re-magnetizing it and making it still stronger, then this new magnetism received by the magnet from the soft iron (originally derived from itself) ought again to react upon the soft iron, increasing its magnetic power, so as again to act on the magnet, and thus, back and forth, keep augmenting each other's power of attraction *ad infinitum*. What nonsense! No; the magnet exerts its power upon the piece of soft iron, magnetizing and attracting it, and, in doing so, attracting or shoving itself by reaction toward the iron, which, in being thus charged from the magnet, forms a sort of conductor or connecting link by which the magnet reaches out through it and attracts other bits of iron in its vicinity, *while the piece of iron itself really attracts* nothing. Plainly, all the work done by the induced magnetism of the piece of soft iron, is the work of the original magnet through this medium.

This may be illustrated by the action of *heat*. A bar of iron, with one end in a furnace, may extend out several feet and burn your hand by conducting the heat of the furnace, just as the piece of soft iron receives and conveys the magnetism away from the poles of a steel magnet to influence other bodies. But here comes Prof. Comstock and tells us that this bar *"is converted into a hot body by induction before it is heated, and then it heats the inducing furnace"!* (See last extract.) Plainly the bar heats nothing except as it first receives and then conveys the heat of the furnace to other bodies, and, so far from returning any heat to the furnace, it only consumes a portion of its heat in conducting it to other bodies at a distance. In like manner, a piece of soft iron near a magnet in becoming magnetized, so far from attracting said magnet, consumes a portion of its power in the very act of receiving and conveying its magnetism to other bodies. Is it possible that so superficial an error as this, so seriously expressed by Prof. Comstock, should have been taught as science for more than a hundred years and not been detected?

THE GRAVITOMETER.

And what is a "Gravitometer?" It is an apparatus for testing the comparative specific gravity of human beings with a view to a better knowledge of human physiology, and hence of the laws and conditions of hygiene and chances for longevity. This device is very simple, yet, as we believe, of great importance in physiological science. No two persons in the world, perhaps, is of exactly the same specific gravity; hence no two persons, even of the same age and sex, are precisely of the same healthful condition of flesh, or hygienic stamina. Upon this fact depends much of the chances of longevity or length of days, other conditions being equal. Yet, so far as we know, the comparative specific gravity of human beings has never yet entered into the theory or practice of therapeutics or dietetics, nor has it claimed its true place or value, as we conceive, in the most exact of all human scientific calculations,—the tables of the life-insurance companies. But it needs only to be suggested, and a simple plan devised for practically carrying out and applying the gravitometer-test to a man, woman or child, and its importance will be self-manifest in determining the hygienic status of persons of whatever age, sex, or condition.

A very brief description of this simple invention will serve to explain its construction and use, and will enable any physician, so disposed, to make one for the use and benefit of his patients and friends; and we doubt not the self-evident value of the invention will commend it, as soon as it is known, to life-insurance companies as well as to medical colleges throughout the land.

It consists preferably of a metalic-lined vessel (to avoid soakage of water) large enough to hold a man, with also an elevating and lowering device or platform within the vessel upon which the person to be tested can step and be lowered into it. Passing up the outside of the vessel is a graduated glass tube, connected with the vessel at the bottom. This gravitometer-tank is first filled with tepid water till it rises in the scale-tube exactly to the point marked zero, with the elevating platform submerged, and also as much of the lifting cords as will be under water when the test takes place. The person whose specific gravity is to be determined is first placed on scales and weighed acurately. From these he steps upon the platform and is lowered into the vessel till the water rises and covers him almost to the nostrils. When all is ready for taking the observation, he lowers or ducks his head beneath the surface for a period of two or three seconds, the rise of water in the tube, if properly graduated, determining the absolute amount of liquid displacement in cubic inches or fractions thereof. By dividing this into the weight of the subject, in ounces or fractions thereof, his specific gravity is determined, as compared to that of water at a given temperature. Then, as before suggested, upon the specific gravity of the subject depends the solidity of his physical structure; and upon which, in connection with age, build, *i.e.*, gross weight of flesh as compared to bone, and somewhat upon habit and occupation, will depend his hygienic condition, and his probable chance for longevity.

With this apparatus the value also of various kinds of food as nutriment for making flesh, and the various degrees of solidity of muscular fiber resulting from different kinds of diet, may be determined with greater accuracy than has ever been known before.

Believing, as we have for a long time, in the importance of some accurate way of determining this question of the specific gravity of human beings for the purposes hinted at above, and knowing of nothing of the kind as having been attempted or thought of, we have devised the apparatus here described, and have named it the *Gravitometer*, and now respectfully dedicate and submit it to the medical profession of the country.

UNCHANGEABLE QUANTITY OF BEING.

BY BARTON S. TAYLOR, M. D.

"Nothing can never become something, and something can never become nothing." This jingle of words has been echoing down through the ages; and by many it has been thought to have as much authority as if it were the voice of God. This postulate is understood to declare that the quantity of existence is unchangeable; that there can be no increase in the quantity of substance. No increase in the quantity of substance is possible, do you say? How do you know? You

assert; I deny; then the proposition must be proven. Perhaps you say: There are certain fundamental truths which admit no proof, and of which it is folly to ask the proof. I answer: True; but this is not one of those fundamental truths. It is not an intuitive or necessary truth. Four-fifths of the human race have believed the contrary. It is not a self-evident or absolute truth. Its contrary is possible; there is nothing in the nature of things which renders its contrary impossible. It is a statement, then, which we may believe or not believe, according as the evidence appears to us; it is a thesis to be proven, and not a fundamental truth.

Three modes of proof have been undertaken. Some have said: We cannot conceive of a beginning, or of an increase in the quantity of substance; therefore, we pronounce it impossible. This makes the human power of thought the limit of the possible. God can do nothing greater than that which man can think of and comprehend. Others declare the unchangeable quantity of existence under the name of the law of continuity, and then identify that and the law of cause and effect. Every effect must have a cause, means, they say, that the effect was preceded by an equal quantity of existence in some other form. Cause and effect are the same in substance in two different forms; the cause passes over into, and becomes the effect. The law of cause and effect is admitted to have a strong intuitional foundation, and by identifying the law of continuity and the law of cause and effect, the former is made to have all the authority of the latter. This is identifying a horse and a donkey, and giving to the latter all the excellences belonging to the former. There is no such causative process in nature. The cause never does pass over into, and become the effect. One substance never transforms itself, nor is transformed, into another substance. In reference to matter, this question was settled by the alchemists three hundred years ago. It is no more impossible to transform one material element into another, than to transmute one immaterial substance into another. Men talk about changing muscular force into heat, heat into electricity, electricity into magnetism, the chemical force into heat and electricity, etc. All such talk is sheer nonsense; no such transformations ever did occur, or were ever produced. But I suppose people will continue to talk this folly for many years yet. It requires only five minutes in which to start a lie; it may require twenty years of labor to stop it.

Then the unchangeable quantity of substance receives no support from this source. It is at most only an induction or generalization from observed facts. We discover no instances of increase or decrease in the quantity of substance; and man is not able to produce any increase or decrease. This is sufficient basis for the induction that natural and finite agencies cannot create new substance. But this is no basis for any deduction in reference to the power of God. From the doings of man, we can learn what man can do, and what not; but from the doings of man, or any other finite powers, we can make no inferences limiting the power of the infinite. We know that there are limits to the divine power; but those limitations are imposed by the nature of things, and by His own nature. God cannot lie, nor act a contradiction. If two measuring rules are unequal in length, He cannot make it true that they are equal. Thus the law of contradictions and the law of identity apply to the doings of God. But an induction from human experience or finite nature can impose no limitations upon almighty power, nor define any such limits.

I see no reason whatever for supposing that when God created the material universe, He used previously existing substance—His own, or any other. "He spake and it was done." "He said, Let there be light, and there was light"; and there is no reason on earth why we should suppose that He used any other substance out of which to form that light. Indeed, our intuitions, the necessary modes of our own mind, demand a beginning for every thing finite; and when new being appears in space, our minds do not ask whether it before existed in some other form or not, but only demand a Creator with adequate power to produce it.

ESCANABA, MICH.

"THE WAVE THEORY."

DEAR DR. FITZGERALD:—Please say, in reply to Mr. L. G. Rogers, that no scientific man, so far as I know, holds to the absurd views of "A Wilford Hall" on the subject of sound, as contained in "The Problem of Life." If any other than the "*wave theory*" is taught in any respectable institution in this country, I am not aware of the fact. I am sure no author of repute teaches any other doctrine. Very respectfully,

N. T. LUPTON,

Prof. Chem., Vanderbilt University.

The above is clipped from the *Nashville Christian Advocate* of May 12th, and contains a specimen of the arguments with which Vanderbilt University ventures to meet the assault of the *Problem of Human Life* upon the received theory of sound.

It is all very safe for Prof. Lupton to issue, from his chair of chemistry, card-fulminations against the new doctrine of sound and in favor of the wave-theory. But the question which the *Advocate*-readers would like to have answered is, dare Prof. Lupton or any representative man in Vanderbilt University he may select, undertake to defend the wave-theory in a series of articles to be printed with our replies in the columns of THE MICROCOSM? We have no doubt that the editor of the *Advocate* would also be glad to gratify its readers by printing them simultaneously in that paper.

We take the liberty here of expressing the belief that Prof. Lupton *dare do no such thing*. He must know too well what is safe for his scientific reputation, to venture such a risk.

If he can draw any consolation from the claimed fact that no "respectable institution" yet teaches anything except the "wave-theory," he is welcome to it. There is not yet a text-book on the subject in existence, or one containing anything else to teach save the wave-theory. How then, could an institution, "respectable" or otherwise, teach it? Besides, the new departure on sound has not yet been before the public more than about four years, and that, too, in its first and crude presentation, without the least formulization. Prof. Lupton is, no doubt, aware that no "respectable institution" ventured to teach the Copernican theory of astronomy for more than one hundred years after it had been demonstrated to be true by its author, so slow is scholasticism to yield to new scientific discovery. Was that a sufficient argument against its acceptance by individual scientists, or in favor of

the correctness of the the Ptolemaic system which it supplanted?

But "*no scientific man, so far as I know, holds to the absurd views of A. Wilford Hall*" &c. This is well put by the Professor, and "*so far as I know*" is good; for he evidently *knows* nothing about the matter. We can inform him that there are already hundreds of professors (able to teach him the first principles of acoustics because they are not afraid to look at both sides of the question), who are completely convinced of the scientific fallacy of the wave-theory, and who are only waiting for a suitable text-book to enable them to introduce the substantial theory into their classes of physical science. If Prof. Lupton wants the names of a dozen of these professors with whom to correspond, we will send him a list who will give Vanderbilt University such a raking on Tyndall's "tin tube" and his "swiftly advancing" tuning-fork prongs, *cutting* and *carving* the air into "condensations and rarefactions," as will make that "respectable institution's" ears tingle.

In conclusion, we take the liberty of sending Prof. Lupton a few copies of THE MICROCOSM with articles on sound marked which will make him think he sees lightning, unless he keeps his intellectual eyes as hermetically sealed as he seems to have been doing for the last four years.

IS MATTER ETERNAL?

WILFORD HALL: *Dear Sir:*—

I am in monthly receipt of your MICROCOSM. I cannot get along without it now. It has become a necessity with me. I long for it as for my daily bread and more so; and I shall continue to take it as long as I can raise a dollar with which to pay for it. I have read the "*Problem*" and am gratified with the manner in which you dissect the arguments, and shatter the fallacies of Darwin, Huxley, and Hæckel. How clearly, in the latter's case, have you proved David right, (Psalms xiv: 1.) I am pleased with the papers of your contributors as a whole, and I luxuriate in most of them for their clear ring and out-spoken logic. Since reading your articles on "Creation of something out of nothing," I have arrived at the conclusion that in all the infinite domain of God's universal space there is no such *thing* as "nothing." *Positivity* and not *negativity* is the normal state of facts in God's universe. I intimated to you once before that I believe *matter*, at least in essence, to be necessarily eternal and coëxistent with Deity. You seem to deny this; and yet, if your suggestion be correct, that God evolved or transformed matter out of His own exterior being,—so to speak,—then His own eternity necessarily involves the eternity of matter, at least substantially. I do not, of course, believe that matter, as we now see it, has so existed from eternity; but that matter in its essential nature has always existed as really and truly as has spirit. At all events, the question, though one of profound thought and worthy of our highest intellectual powers, is not one which should divide Christian believers.

And now, my dear Brother and friend, let me assure you that you have my best wishes and prayers that your life may long be spared to battle with false science, and wield, as you have been so nobly doing, the resistless weapons of truth against the already tottering superstructure of atheistic as well as theistic evolution. You are doing a grand work, and may it continue. Very Truly Yours,

OTSEGO, MICH., May 9th 1883. JAMES SMITH.

MICROCOSM—THIRD VOLUME.

This is about the time for the friends of THE MICROCOSM, who approve of the work it is doing, to commence getting up clubs of new subscribers for Volume 3, which begins the first of August. If this journal has deserved approval during these first two years of its existence, we are determined that it shall more than deserve it in the future. We do not, of course, expect that every reader can endorse all he may have seen in its pages. This would be an impossibility in any journal containing so many original papers on such a vast range of religio-philosophical and scientific subjects. That these papers have generally been instructive, or at least thought-provoking, we have an abundance of proofs. We would rather, by far, write that which will keep men wide awake and make them think, though it might admit of serious discussion, than to fill our journal with *opiates*, however well writen, about what every one already knows or believes. We are inclined to prefer those *meteorites* of thought which become visible by the very friction which they encounter in passing through our intellectual atmosphere. Those who agree with us in this regard are invited not only to read THE MICROCOSM themselves, but to encourage their friends to do the same.

Any reader who will send us the names of three *new* subscribers for the next volume, with the money ($3), will receive that volume gratis. Old subscribers can renew their subscriptions for volume 3, by simply inclosing $1. This magazine, so far, has cost every penny we have received for it; and we believe that no such amount of original reading matter is furnished for the same price in any other journal now published. It is only by a very large subscription-list that it can pay expenses at $1, and we are very thankful we have such a list. If we do not keep it, and double it before another volume is ended, it will not be our fault. Old subscribers, therefore, who propose to continue to take the next volume will greatly aid us by renewing as soon as possible after receiving the last or July number, that we may be able to judge approximately as to the size of the edition to start with.

Address, HALL & Co., 23 Park Row, New York.

A SIMPLE DEMONSTRATION.

Rev. N. S. Lowrie, Gorham, N. Y., writes us as follows:

"Take spool-thread two yards long, attach a large tablespoon at the middle of the thread, wrap the two ends around your fore-fingers and thrust them into your ears tightly, excluding all air, and then let the spoon dangle. Have some one strike the spoon with a piece of metal, and you will hear the effect of a magnificent church-bell in the distance! This demonstrates the utter fallacy of the air-wave-theory of sound; for how can air waves wriggle up that thread and get into your ears when they are hermetically sealed? Oh, pshaw! You have killed the wave-theory dead as Julius Cæsar, and let all the people say Amen."

[We have tried the experiment as described by Mr. Lowrie, and find the effects to be beautiful and wonderful! Plainly, nothing but substantial sonorous pulses, analogous to electricity, could traverse that thread, switch off upon the finger, enter the ear, and produce the sensation of hearing. EDITOR.]

PROF. JOS. S. LARGE.

Mr. Goodrich is still receiving letters from the above-named aspirant for the cash-prize offered to any one who would produce a gennine case of sound-interference and silence caused by sounding two unison instruments half a wave-length apart as the wave-theory teaches. Instead of *two unison instruments*, however, making two distinct tones whose air-waves, if they produce any, are well-defined and free from all complication, this astute scientist selects a waterfall over a milldam, extending continuously across a river. Then to make two unison (?) instruments of it, he proceeds to divide the dam in the middle (all in his imagination of course), and, utterly ignoring the trivial matter of "half-wave lengths" between the two halves, he listens to this waterfall a couple of miles away; and because the sound appears to die out at certain times, owing to peculiar conditions and changes in the atmosphere, our professor actually goes before a magistrate *and makes solemn oath that he has produced a genuine instance of sound-interference and silence according to the wave-theory!*

Will the reader believe it, that Prof. Large not only swears to this fact, but he sends on the affidavit duly certified, and proposes to Mr. Goodrich to compromise by taking one half of the prize if there is any doubt about the matter!

We replied to this milldam problem in a former number of THE MICROCOSM, and showed that instead of "*two* unison instruments" in this mentally-divided waterfall, as the professor arbitrarily claims, there are millions of discordant instruments sounding at one time, each individual drop of the water making its own separate noise as it falls, and the combination of which produces the roar heard. In sober earnest we would advise Prof. Large, before he innocently perjures himself again, to read Prof. Tyndall's explanation of this so-called law of sound-interference in his text-book at pages 259, 260. If he will do this, he will stop his ludicrous correspondence with Mr. Goodrich.

THE SOUTH-WESTERN METHODIST.

A writer, John Emory, in the *S. W. Methodist*, of St. Louis, Mo., prints a criticism upon our argument in the *Problem of Human Life* based on the slow motion of the tuning-fork's prong, and the impossibility of such motion sending off air-waves 1120 feet in a second, or iron-waves 19,000 feet in a second. It is plain that Mr. Emory has not seen our first reply to Prof. French on that subject in the March MICROCOSM, or he never could have written as he did. He says, for example, that if the prong of the fork is held, while sounding, in a heap of sand, the grains will be shot away like arrows. Now, we inform Mr. Emory, and all who feel disposed to try the experiment, that a tuning-fork will vibrate sufficiently to produce an audible sound when its motion is so reduced that it will not drive grains of sand a hair's breadth, or far enough to be observed with the naked eye. Is it possible for such infinitesimally slow motion (less than at the rate of *one inch in a second*, at the swiftest part of such swing) to send off air-waves 1120 feet in a second? Clearly not, though it generates sound-pulses which radiate at that velocity. Will some one of our subscribers, who is acquainted with Mr. Emory, notify him? Or still better, will the *South-Western Methodist* copy this statement, and thus not only enlighten Mr. Emory, but also its numerous readers who have been unintentionally misled by his article?

NEW TEXT-BOOK ON SOUND.

For more than two years we have been urged by teachers and professors of natural philosophy to prepare a condensed text-book on acoustics to embody and elucidate the new theory of sound as based on *substantialism*. Many of these professors have assured us that they are now teaching the old theory under protest, and that they would at once introduce the new but for the want of a suitable text-book. But the editorial cares of this journal and the supervising of books we have been getting out, with other duties constantly pressing, seemed to forbid our undertaking this additional task. We tried, by correspondence, to induce two or three professors to undertake the work of preparing such a book for the use of schools and colleges; but they were too much preoccupied by other duties and engagements that could not be put off. We have, therefore, decided to undertake the work ourself, and to prosecute it as fast as practicable, consistent with the interests of this magazine which have the first place in our heart, and the paramount claim upon our fostering care. Students of science and friends of the new departure in acoustics can, therefore, let it be known to their friends that a text-book on sound, simple enough for young students, and profound enough for professors, is now preparing; and that teachers who are convinced that the old theory is wrong, as we know of hundreds who are, will soon be enabled to teach their classes what they conscientiously regard as true science upon this subject.

SIMILIA SIMILIBUS CURANTUR.

(EXPLANATION.)

In drawing upon the above named law, to illustrate a point in the system of redemption, we had not the slightest intention of being discourteous to medical men, of *any* school or system of practice; we thought of nothing but the point to be illustrated.

Will Doctor Stuart say as much for his use of the word "*regular*"? Come, Doctor, "one good turn deserves another." By your use of the term "*regular*" you imply that Eclecticism, Hydropathy, Electropathy, Etheropathy, and every other system of medicine, but Allopathy, is irregular, immethodical, disorderly! Your use of the term may have been from the best of motives. But, it implies too much without some explanation. Would not the term Allopathy have been less indelicate? and, would it not have grated less harshly upon the sensitive ears of those who conscientiously differ with you and your school in the theory and practice of medicine?

With all kindness, Doctor, we submit the above. Respectfully,

J. G. BURROUGHS.

SUBSCRIBERS PLEASE NOTICE.

In changing residence a subscriber should always make arrangements with Post Master or some friend to forward his paper at least for the next month, to his new address, because it may be some weeks before the notice (even if sent to us promptly) will find its way to our mailing department. We try, however, to make these corrections as soon as possible after reception, though the wrappers for the next number may already have been written to the old address.

IS LIGHT MATERIAL PARTICLES?

BY PROF. W. D. STRONG, OTTUMWA, IOWA.

We extract the following from *Chamber's Cyclopædia*, and solicit from the Editor of THE MICROCOSM a brief explanation or criticism of the same. From what we have gleaned from the "*Problem*," we hardly infer that the author's views of Light are in exact accord with those of Newton, as here explained, viz:—

"Newton adopted the corpuscular theory of light, in which it is supposed to consist of material particles. . . We shall see immediately that this beautiful investigation led to the destruction of the theory from which it was deduced. But, independent of this, there are many grave and obvious objections to the corpuscular theory; for it involves essentially the supposition of material particles impinging on the eye with the astonishing velocity of 200,000 miles per second! If such particles weighed but the *millionth* of a pound, each would have something like ten times the momentum and *six million* times the penetrating power of a rifle bullet. Suppose them to be a million times smaller yet, as millions of millions of them must be supposed to enter the eye at once, coming from every point of the surface of every visible object, it seems impossible to reconcile such a hypothesis with the excessive delicacy of the organs of vision. . . . . Now, Newton had shown that refraction, such as that of light by water, if predicated of moving *particles*, requires that they should move faster in water than in air. Huygens, again, had shown that if such refraction be predicated of *waves*, they must move slower in water than in air. Fizeau and Foucault found, by direct measurement, that light moves slower in water than in air. Hence, it is certain that *light consists in the transference of energy, not matter;* and the Undulatory Theory is based upon this fact."

REPLY TO THE FOREGOING.

With a moment's reflection, the reason must be clear to every reader, why Sir Isaac Newton could not maintain his corpuscular or emission theory of light; for, a more unreasonable or impossible hypothesis was never propounded. How he could, for a moment, have supposed that "*material particles*," however minute, could penetrate and pass through the hardest crystals,—even diamonds,—without meeting with resistance, to say nothing of pouring into the eye at such an enormous velocity without injury to that delicate organ, is one of those profound mysteries which great scientists are called upon to explain.

The truth is, the fundamental idea of *substantialism*, which is so deeply taking root in the minds of thoughtful investigators, and upon which the present corpuscular doctrine is based, never entered the mind of Newton. That fundamental idea consists in the general classification of *substance*, under two heads—*material* and *immaterial*, *corporeal* and *incorporeal*, *ponderable* and *imponderable;* and that one of these classes is as really and truly substantial or entitative as the other. Had Sir Isaac Newton caught a glimpse of this dual nature of the substantial universe, he would have avoided the inglorious failure of his theory of "material light particles" by never having adopted such a wretched position in science, and all the waste of mathematics in figuring about the required smallness of such "material particles" to avoid putting out one's eyes, would have been saved by him and his friend Huygens.

But now comes the amusing part of this mathematical abandonment of the corpuscular, and adoption in its stead of the undulatory theory of light. After they had determined, by careful figuring, that the "emission theory" was no good, because its "material light-particles" would put out people's eyes even if they (not the eyes but the particles) weighed only the millionth part of a pound each, they decided to adopt a newly-invented "*ether*" like a "jelly," "with the properties of a solid" and "possessing inertia," as Tyndall tells us, whose *material* waves would dash into the eye with the velocity of light, and at the rate of only "699,000,000,000,000 waves in a second"! (*Tyndall on Light, p.* 66.) And, of course, anybody's eyes ought to stand that much "jelly"!

Well, what was all this prodigious discovery of *ether* for; and what was it that led to this scientific leap from the frying-pan into the fire? Why, it all came from the apparent difficulty of *light-refraction* in water, and ocurred solely because Newton and Huygens did not grasp at that time the true and beautiful doctrine of *substantialism*. Had they realized that light was an *incorporeal substance* instead of matter, they would have had no more difficulty in explaining refraction by waves or pulses of substantial light itself, than by waves of substantial *ether* for the existence of which there has never been either use or evidence. And further, had they been fortunate enough at that time to have caught the broad idea of innumerable immaterial substances, it is plain to reason that not only light but sound itself would for a hundred years up to this date have been taught as substantial emissions in all the colleges of the world, instead of being held as the nonsensical wave-motions of the air; and the author of the "*Problem*" would have been spared the terrific battles with stubborn scientists he has been obliged to fight during the last two years.

EVOLUTION OF SOUND.

Those who might desire to see the sound arguments as they appear in the "*Problem of Human Life*" at the lowest possible cost, are informed that we have a few remaining copies of that part printed and bound separately (more than 200 pages) which we will send, post paid, for 50 cents—half-price.

MR. TIERS' GREAT PAINTING.

We are very much gratified to learn from Col. W. R. Denny, of Winchester, Va., for whom Mr. Tiers, the artist of this city, executed a family painting, that he is enthusiastic over the merits of the picture since getting it home and exhibiting it to his friends. That this enthusiasm is not a mistaken or superficial estimate may be inferred from the fact that Col. Denny and his family have personally visited and inspected most of the fine art galleries of Europe, and know whereof they speak when they pronounce judgment upon such a work as that of Mr. Tiers. As a fruit of this excellent work Mr. Tiers has already several commissions from the Colonel's immediate neighbors which he is now busy executing, We are glad at this result, since we took some little risk in venturing originally to commend Mr. Tiers' artistic ability, knowing very little, as we do practically, about fine art.

THE EDITOR'S SCIENTIFIC LECTURES.

We have had, for the past three or four years, numerous applications to go to different parts of the country and deliver lectures on select scientific subjects. We have been forced to decline these liberal proposals, owing chiefly to the demand upon our time at this office. As we propose, the coming fall and winter, to have assistance in our editorial and other work, we venture to announce our willingness, as soon as the text-book on sound is completed, to take occasional runs into the country and deliver, say, two lectures in a place if required, on alternate nights. Those friends who have desired our services in this capacity will make a note of it, and let us know in time for making due arrangements. Friendly exchanges please notice.

DR. VAN DYKE'S NEW SERIES.

We congratulate our readers on the opening of the Rev. Dr. Van Dyke's new series of very instructive papers, exposing the assumption that man's *religious nature* is an evolution from inferior animals. Last month we completed the Doctor's series of five papers on the supposed evolution of man as a *physical being*, which afforded the most valuable considerations on this now exciting topic of discussion. The other branch of the question—man's religious nature—promises to be even more interesting, as the problems involved are more profoundly intricate. The present series will run far into the third volume of THE MICROCOSM.

REPRINT OF VOLUME I.

We are going ahead regularly electrotyping the first volume of THE MICROCOSM in pages of uniform style with this. We expect to have it completed in August, and will mail it immediately to all who have sent the $1. It will be well printed on good paper, and substantially bound in cloth. Mailed post paid at $1 per copy. Not a penny will be made on the first 2,000 copies. All who want that initial volume of this Magazine in order to preserve a complete series of the work till the Editor shall be called to place his charge in other hands, should send their names. By request of many subscribers, who were justly dissatisfied with the picture accompanying the August number of this volume, we have decided to add the superb steel plate engraving of the Editor as a frontispiece to Vol. 1,—the same that now accompanies "*Universalism Against Itself.*"

NOT ROOM ENOUGH YET.

THE MICROCOSM is still not large enough to contain the matter continually crowding for admission. We could easily fill sixteen pages more every month with choice original papers. We regret this want of room, as so many excellent contributions left out tend to hurt the feelings of dear friends who have taken great pains to prepare such articles. We can only wait patiently, and request our contributors to do the same, and we will try to give all a hearing. We have thought seriously of suggesting to our readers the propriety of an increase in the size of this magazine by adding *sixteen* more pages and raising the price to $1.50 a year. But we fear that the majority of our subscribers will prefer the present size rather than incur an additional expense of half a dollar. Consequently, as much as we desire to give all a hearing, we must keep the magazine at its present size and price, for another volume at least. Then we will see. In the mean time correspondents in writing to us during the next year can express their views.

CONTRIBUTIONS FOR JULY.

Among the numerous articles which will appear in the July or closing number of this volume of THE MICROCOSM, are the following:—

"Kind Words," Rev. Dr. Swander. Characteristics of the Forces of Nature, No. 1., Isaac Hoffer. Science and The Word, Rev. Dr. Hamlin. Evolution, No. 2., Rev. Dr. Van Dyke. Freedom of the Will, No. 2., Prof. Kephart. Correlation of Forces, Eld. Towne. Law of Mind, No. 3., Rev. Dr. Roberts. Spiritualism, No. 2., Capt. Carter. Modern Philosophy and Christianity, No. 2., Prof. Lowber. Southern M. E. Ministers' opinions of Prof. Lupton's Card, and several other articles, some of which may have to go over to the August number. Also, the leading Editorial on the Cause and Remedy of Cyclones, with many other articles, and Editorial replies to scientific objectors. List of Contributions for the opening number of 3d volume (August) will be given in the July number.

THE PROBLEM OF HUMAN LIFE.

More than 6000 of our present subscribers for THE MICROCOSM do not own the above named book. Each person interested in this magazine ought to have a copy of that book also in his library. It is one of the cheapest $2 books published, containing one-and-a-half times the amount of reading-matter of this entire volume of THE MICROCOSM. Any subscriber desiring the work, can remit $1 (half-price), when sending his renewal for Vol. 3 of THE MICROCOSM ($2 in all), and the "*Problem*" will be sent post paid. We will also say that those subscribers who do not yet own "*Walks and Words of Jesus,*" ($1) or "*Universalism Against Itself,*" ($1) can remit 75 cents and either book will be sent postpaid. These offers are only to subscribers for THE MICROCOSM. HALL & CO.,

23 Park Row.

WILFORD'S MICROCOSM.

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THE CORRELATION OF FORCES.

BY ELD. C. S. TOWNE.

In unfolding this law I use the term 'correlation' in its strict etymological sense. A child stands correlated to a father. If man is first a child, now, and in all antecedent stages of his history, the first man must have had some being standing above him in the relation of father, who must have been not only the man's instructor, but also, in some way, his Creator and the author of his being. Now, by the law of the Equivalence of Energy, there must be, in the fatherly Creator, the full equivalent of the child. But, as we have already seen that the powers of spoken and written ideation can only be developed by a line of education altogether separate from Nature and wholly above it, it follows that there can be no correlation between man and Nature in the higher plane of his thinking, speaking, and writing energy. In all human action force is that which causes motion. Energy, then, lies back of force; and energy is exclusively the power of a person to act. Force, then, is manifested when the conscious ego is acting upon substantial entities to move them, whether they be material, spiritual, or psychical. Energy is the power to push; force is the actual pushing. In the case of man we find that force is never manifested except as the immediate result of the action of human choice and will, guided by a variable measure of spiritual understanding. A correlation of forces, then, in its primary meaning, is a correlation of conscious, intelligent entities or persons related one to the other as cause and effect. At this point let me call attention to a serious misleading error. Men speak of the "inherent forces of Nature;" of "blind, insensate forces," alluding to the operations continually going on in Nature; of "physical forces," etc. Now, Nature is, *apparently*, made up of matter; that which is material. But the prime property of matter is inertia. Then to say that force or the power to give motion, is inherent in matter, or material things, is a flat contradiction of terms. Again, that which is blind, insensate, has no power to see, feel, hear or move; in other words, is wholly devoid of all marks of intelligence. Hence, the expression, "blind insensate forces," is a gross solecism, an utter absurdity. Show me a single point in all the operations of Nature marked by the total absence of all those powers which prove the presence of controlling mind! The orderly action of intelligence is forever present in all Nature, and reaches from the simplest act of crystallization through all vegetable and animal growth up to the omniscient mind of Nature's God. The same is true in the works of man. The watch has no energy or force within itself to move a single wheel. In winding up the mainspring, I transmit to it *my* energy; and the force that moves the wheels round and round through the stretch of twenty-four hours is *my* force. The orderly movements of the watch are the result of a seeing and thinking force that reaches back from the mechanism to the God-like intelligence of a human mind whose thoughts have originated and fashioned the mechanism, and whose force is every instant pushing the wheels round till the energy imparted is exhausted. There are no material, insensate forces in Nature: we can rightfully predicate force only of persons. Ultimate atoms are the conductors of personal energy; all Nature is only the arena whereon are manifested the forces inherent in divine and human persons. Let us return to the correlation. As man has a beginning, it follows as a matter of absolute necessity that he should have an antecedent correlate in which there is a complete equivalent of all human powers. We know that man lives in a sphere of activities which, without him, would never be manifested. The activities with their results, and the humanity are reciprocally suggestive; the presence of either proves the possible or certain existence of the other. When we look upon the ruins of ancient cities raised from the sleep of many centuries, we know that the choosing and deciding powers of the soul, guided by the understanding powers of the spirit, have here been brought into action through the instrumentality of a physical body. We know that in every case this trinity of human natures has been present to guide, control, and fashion the whole work. But we see, correlated to this human work, those recorded manifestations of intelligent and designing power in the universe that lie wholly beyond the wisdom and capabilities of man, yet within the evidence of our senses; and we know that the correlation is a true one, because if there were no manifestations of infinite power in the world of Nature upon one side, there could be no exhibitions of human power upon the other side; and we must remember that all these exhibitions of power always center in a person. When, then, we look upon the works of man, and know by all the instincts of humanity that they *are* the works of man; and when we further know that all this lower plane of silent human action is inseparably connected with a higher plane of spoken and written thought which has reached down, and ever is reaching down into the lower plane to guide and control the evolution of its action,—must we not look upon the physical universe including man, as the work of some being whose thinking and speaking powers of intellect and will are in proportion to the work we see? If there be, then, a true correlation of human work with that which is superhuman, I do not see how we can avoid admitting the following correlations embracing personality.

1st. There is correlated to the human soul a divine Soul, whose omnipotence of will has projected, commanded, and now controls the physical activities of the universe. Without the all-controlling will of a divine Soul we cannot conceive that there ever should have been the independent will of a human soul.

2nd. Correlated to the human spirit there must be a divine Spirit, whose omniscience of perception beholds all truth untarnished by a single speck of error; whose understanding grasps all relationships which connect truths to each other, to the divine Soul, and to the human; and whose unlimited power of reason is able to take all truth and make an infallible application of it to all the exigences of the universe. Without the energy of a divine Spirit we cannot conceive that there

ever should have been a perceiving, understanding, and reasoning human spirit.

3rd. Correlated to the human body there is a divine Form, through which, as an instrumentality, the united powers of the divine Soul and Spirit are manifested; these three uniting to form the trinity of the God-head dwelling and working together in the unity of ONE GOD, even as the human soul, spirit, and body unite to form the trinity of manhood working and dwelling together in the unity of one man. This is the primary correlation of divine and human forces, which, rising above all other exhibitions of power, centers in the throne of the eternal One; and thence its infinite powers of action flash out upon the telegraphic lines of eternity forever and forever. Here, then, with awe and adoration we stand by the throne of the universe to see that the mysteries of eternity lie out before us on every side in ever-widening circles; to understand that it is the ever-living action of this energy radiating from the divine Soul and Spirit which must successfully guide us in all our researches outward through all the unmeasured fields of knowledge; and finally, to reason from all this that an unreserved yielding of our own souls, spirits, and bodies to the holy influences of this divine Energy will alone secure our eternal happiness. This is the demonstration of the divine Being in his power and attributive personality given to us by the things that are made, man being included in those things. But, in close and inseparable connection with this primary correlation, we find the secondary correlations to which I call your future attention.

SCIENCE AND THE WORD.

BY REV. F. HAMLIN.

That scholarly son of Germany, Isaac August Dorner, tells us that "Consciousness is the only true foundation upon which to rear a superstructure of theological doctrine." The truthlessness of this statement appears when we consider on the one hand the instability and variety of human experiences, and on the other, the inability of man to interpret with any degree of certainty, the experiences and emotions of his own soul. In the verbal descriptions or statements of introspective moral conditions, man unaided by revelation is like a ship rudderless, constantly influenced by gales of prejudice, and tides of association. As the presence and pressure of the human hand upon the wheel is indispensible if the ship is to reach the desired port, so the help of the personal Christ in the truths He enunciated, is necessary if we are to reach correct conclusions in defining personal Consciousness, as it relates to theological doctrine. *Now Hœckel, Vogt, Buchner, Huxley and their co-laborers are the Dorners of the Scientific World.* Independent of Scripture they seek to rear the superstructure of scientific truth, when it is as impossible thus to reach correct conclusions as for a mere man to evoke light from darkness by a word. He who lends all his energies to the establishment of a pre-conceived theory, will, as a rule, reach results as unsatisfactory as did La Place: he sought in the Solar System for indications of an end, or traces of a beginning. History repeats itself, and *failure*, the fate of the ancient philosophers, was his. Now we hold,

1. *That he who ignores God's Word, is most liable to drift into erroneous scientific beliefs and statements.* This appears, if we consider that the *intelligent* acceptance of Scripture as the inspired Word of God, presupposes a greater regard for fact than for theory on the part of the individual believer. The whole Christian system has its basis in *facts*. Human Depravity, and helplessness, prophetic expectations of a Messiah, the Coming, Death, Resurrection and Ascension of Christ, the fulfilment of prophecy concerning the Jewish People, the elevating and renewing influences of the Christian Religion upon the living, and its hope-inspiring dominance over the dying, all these facts lie at Christianity's foundation; and he who *intelligently* accepts the Word as inspired, and the history as true, is, in reaching that conclusion, unconsciously schooling himself to search for facts rather than theories in his pursuit of truth. This appears when we ask why more skeptics are found among Physicians than among Lawyers. The every-day calling of the latter, lead them to consult, not *symptoms*, but evidence and fact. We believe, that if every scientist would spend five years in honestly studying the facts of Scripture before he entered the field of scientific investigation, he would not only be ever after that a Christian Scientist, but the influence of that five years of study would so modify his methods of examining scientific questions, so utterly divorce him from clothing *theories*, rather than seeking *facts*, that his whole subsequent career would be a greater success in his chosen field of endeavor. *Indeed, it is only on the highway of fact that man must find the hub, whence shoot out all well-seasoned and resistive spokes of scientific truth.*

Out on this trackless plain of human study, 'tis only as the traveller follows the immutable direction of the leaves of this Compass Plant of fact that he may expect to reach the Camp of "Pure Gold" where "yard sticks" are never broken, venerable theories are never exploded, and the "unison tones" of "substantialism" never produce "silence" on the part of College Professors!

Nor should we forget that the guidance of the Divine Spirit may not be expected by those who insult Him, in that they ignore the Bible which is His word. This is philosophical. While we do not believe in the infallibility of Christian Scientists as they seek truth, we do hold that a greater number of *facts* are discovered by them than by others. And admitting the personality and mission of the Holy Spirit, we may expect greater light to flash from Him upon the minds of His friends, than of His enemies. Here, history instructsus. Sir Wm. Herschel turning away permanently from Smith's Harmonies, and temporarily from Scripture teachings upon the subject in hand, made "Ferguson's Astronomy, and his own carefully prepared lenses, the almost sole means and instruments of his investigations, and he originated the Nebular Hypothesis." A later student, adopting and developing this speculation, assigned the generation of the heavenly bodies to gradual aggregation and condensation of a highly attenuated self-luminous substance diffused through space. The Rosse telescope demolished the theory, and then Herbert Spencer (an open Skeptic) came to the support of the "Nebular Hypothesis;" but he only afforded Proctor an opportunity to refute his silly statements, by showing that Spencer's theory does not account for the distribution of the masses of the Solar System, and he suggested to Spencer a radical modification of his hypothesis. But now, "Mirabile Dictu," a *Kansas Divine*, (Rev. J. W. Roberts,) has, in a series of clear logical articles, utterly annihilated the whole "Nebu-

lar Hypothesis" by showing that "what matter does not, and cannot now do, it never did, could, or can do;" and that, therefore, it was even impossible for "matter to generate any active force, vitality or intelligence, which could operate upon itself to modify or change its nebular or gaseous conditions in the slightest degree." And this he proves by Newton's formula of three laws of motion! Indeed, the whole history of scientific study, is replete with illustrations of the truth, that Christian Theists seem, as a rule, to be *Divinely helped* in their attempts to interpret Nature, and only fail when (lured by skeptical precedent) they for a moment pursue theories rather than generalize facts. It was neither a skeptic nor an atheist who slaughtered "Spontaneous Generation," or strangled "Evolution." It was not a "liberal" Hercules who slew the Hydra named "Wave Theory"; and decapitating it stood upon its lifeless form, and *waved* its gory head in the very face of its followers, and at the same time made the cooling head speak, and cry out "If a man die he shall live again." (That was a grand *haul!*) Thus, we see, that the rarest flowers laid on the altar of Science in all ages, have indeed been gathered in the gardens and wildernesses of the world, but *the dew and divinity* of Heaven have rested on every bud and blade. "Godliness is profitable unto all things, having promise *of the life that now is.*"

2. *Nor should these reckless, Bible-hating theorizers forget that they will ere long face the contempt of men, and the opposition and vengeance of Jehovah, &c.*

"Where have these Cæsars fed?" The strongest minds of our day are the intellectual offspring of Christianity. No less a celebrity than Thomas Arnold, of Oxford, tells us that the development of English Literature, was at bottom but a chapter of its religious history. That with the advent of the *Christian religion* there came through missionaries from Rome, not only the Culture of the Countries bordering on the Mediterranean, but an *intellectual awakening* as well."

To Christianity primarily is the world indebted for England's Bacon, and Shakespeare, and Pope, and Bunyan, and Butler. The subtle J. S. Mill, the skeptical George Eliot, the scholarly George Macdonald, the perspicuous Thomas Macauley, the rest-seeking Carlyle, the chattering yet smooth Voltaire, the sophistical Mirabeau, the half-rescued, half-inspired Rousseau, the persistent Hæckel, the ethereal Mayer, the caloric Tyndall, all the men whose eyes flash in anger at Christianity, and the name of Christ, yea, "sparkle with passion like the Jewelry of Hell," would, had it not been for Christianity, have lived and died unknown. Christianity is grain and lash to intellect, at once giving her strength, and energy and fire, by which she takes the bit, and speeds like lightning along the chosen track of investigation and discovery. These followers of "cunningly-devised fables" cannot, with impunity, trample upon the very parent of their intellectual strength. George Gilfillan has well said "Never is ruffian more detestable than when insulting the beautiful." And so they who ignore the Hebrew and Greek Scriptures are speedily blasted with reprobation before God and man. It will fare with them as with Uzziah, when he went in to profane the temple of the Lord. That instant, the fatal spot of Leprosy rose to his brow, and while all around sought to thrust him out, he himself hasted to depart. He who tramples on the Word, insults the whole race, in trampling on a book at once so truthful and beautiful: and he will, as a moral leper, be dragged without the gate by an outraged world, and perish in his own shame. God has wisely guarded His book by an awful beauty (the beauty of truth), which, like a hedge of roses mingled with thorns surrounds it all. In imagination I see Job and David conversing. Pointing to these proud yet princely intellects, the former exclaims, "God poureth contempt on princes;" and the latter, voicing the feelings of both, declares "Our soul is filled with contempt." And Lo, now Daniel, "prince of Dreamers," rises from his long slumber in his Susean grave, and with Gabriel's trumpet-blast ringing in his ears, he cries, "Some shall awake to everlasting Contempt."

POUGHKEEPSIE, N. Y.

KIND WORDS.

BY REV. J. I. SWANDER, A. M.

Human kindness is the noblest exercise of human power; and human gratitude is the reciprocal activity of its appreciation. The man who lacks the power to appreciate a kind act is more unkind, in the wretchedness of his poverty-stricken soul, than the individual who is so fearfully and wonderfully made as to have no room, in the narrow compass of his being, for the cultivation of a benevolent emotion. Benevolence takes form either in words or deeds, or in both, as it is clothed upon with the beautiful garments of unfeigned charity. Benevolent deeds may speak louder than words; but kind words communicate comfort and cheer with an eloquence peculiar to the warm breath of sympathy which gives them utterance. They have more power to drive away the tortuous devils of grief and anxiety than all the deeds of heartless, voiceless giving so frequently performed by the modern monuments of pharisaic ostentation.

The writer of this article has no reason to complain of any intolerable torture from the source just indicated; yet his recent surroundings have been such as to increase his appreciation of kind words and good advice. The latter has been tendered in quantities that indicate the marvelous liberality of those who seem to think it more blessed to give than to receive—such commodities. These admonitory messengers have visited us from different points of the scientific compass. Dr. Hall may think that he is happy in the reception of "Kind Words," and felicitate himself in the blessedness of suffering persecution for truth's sake; but let him come to Fremont, Ohio, and look over our file of advisory letters, and acquaint himself with their contents of condemnations and congratulations, and he will go back to Park Row concluding that he is not the only man within the reach of sympathetic stationary.

These epistles, with few exceptions, seem to have been inspired by a most commendable spirit; and the advice thus tendered was evidently prompted by a broad and deep sense of duty to one who was supposed to be in danger of falling from scientific grace. How exceedingly unkind, then, it would be on our part, addressed, as we are, with such fervent devotion to the cause of our rescue, not to act, as far as possible, upon the advice so gratuitously offered. Unfortunately, however, some of these kind admonitions cannot be obeyed. Our counselors are in conflict with each other. There is evidently an uproar in some of the Synagogues of established theories. Some

say that Wilford Hall is a good man: others declare that he deceiveth the people. One learned friend gives us the information that the *Problem* is right in its masterly annihilation of Huxley and Hæckel, since they have no orthodox friends, but wrong in opposing the compromise cowardice of theistic evolution. Another acquaintance, who does not read Genesis in the light of the Darwinian commentary, declares that all evolutionists are guilty of "changing the truth of God into a lie." Two eminent professors have spoken to us upon the subject of the new departure in acoustics; and now, in this paragraph, they speak to each other. The one announced it as his belief that Wilford was correct in teaching the substantiality of the soul, but wrong in his corpuscular theory of sound. The other declared that Hall had studied the subject of acoustics, and that "the best evidence of his correctness is the fact that no one of reputation in acoustical science has dared to attempt anything like an elaborate and dignified refutation of his alleged heresy." (Anxious eyes are now turned toward the July No. of the *Reformed Quarterly*, in which the knowing ones have reason to expect something upon the subject that shall reflect the ability of rare scholarship, and the courtesy of a refined gentleman.) One correspondent informs us that a great scientific revolution is at hand, and congratulates those who are able to discern the signs of the times. Another friend, who has been looking through the goggles of conservatism for many years, serves us notice that "Substantialism" is the very Sodom of scientific iniquity, and advises us to flee the wrath to come. Down to the present time, however, we have made no arrangements to flee. Indeed, we prefer to remain and witness the conflagration, believing that the fire from heaven will not consume the sappy scions of vigorous truth when old heresies are so much more combustible.

But time would fail us to tell of all the kind advice so generously offered by our sympathizing friends. We have concluded to sample the whole lot, and herewith submit a few specimens which may be taken as fairly representing the balance of the budget. It is not our intention to betray their confidence by giving their names to the public. Such a course would involve a breach of trust and propriety as unpardonable as the crime of our incipient heresy in science. Besides, it might discourage a continuance of their valuable counsels in the future; and we would thus be left to grope our way in the light of mere truth and reason, piloted by only such demonstrations of scientific facts as amount to nothing more than absolute certainty. But to the promised samples—eclectic medicine in homeopathic doses, accompanied by allopathic directions. Let us open a few packages, and attempt the analysis of their contents.

1. The first is from an ex-professor of higher mathematics, in one of the leading colleges of our country, who was relieved of his professorial charge because the students under his slow and easy conservatism began to clamor for something like a wreck of matter or a clash of worlds to break the miserable monotony of scholastic diagrams and chalk. He has sent us his contribution in the following cool and classical vernacular:—"Do not go too far in company with Wilford Hall. He is all right in religion, but knows nothing about physics. He ought not to dispute with men who have spent all their lives in solving the mysteries of science." All right in religion! How glad we are for this comforting information from such an authoritative source! It supplies us with a fresh stock of Christian courage to hope that we shall yet meet him (*i. e.* Wilford) among the substantial "spirits of the just made perfect." "All right in religion," and—all wrong in science! We do not believe that such a thing is possible. No man can be all right in science, and remain entirely wrong in religion; neither can an individual be all right in religion and continue ignorant of Nature and Nature's laws. "Knows nothing about physics"! Indeed! We venture the assertion that our patron saint in science has never read the "*Problem of Human Life.*" If he will turn to the luminous pages of that famous book, and read it with candor, and without prejudice, and then, in the noon-day glare of this progressive age, look the world in the face, and say that Wilford Hall knows nothing about physics, we will—well we will present him with a pair of the most recently improved spectacles, through which, it is hoped, he will be able to see the truth in the original beauty of its unclouded light. "Ought not to dispute"! Strange! Christ and the apostles disputed in their day with the fossilized custodians of wisdom until not one stone was left upon another in what was then supposed to be the established order of things. "Ought not to dispute with men who have spent all their lives in solving the mysteries of science"! What useless lives! What false solutions! What a repetition of history! Did not some of the Popes of the 16th century offer similar advice to the friends of the immortal Reformers? Did not the dignitaries and doctors of a defunct Ecclesiasticism seek to suppress the truth by the employment of similar means? Yet the work which was started of God, and carried forward through His chosen servants, continued to gather additional strength, and number new advocates in the mighty march of its progress. Less than four hundred years have changed the central channel of the world's devotion and thought. How majestically the river of substantial Protestantism—Protestant Substantialism—flows on in its manifold mission of fidelity to the truth, beneficence to man and glory to God. Outside of this stream, in the stagnant puddles of popery, the process of "solving the mysteries" is still going forward (?) in that fixed and finished theory of religion which holds the traditional mummeries of men as practically of higher authority than the Eternal verities of God.

2. Number two is a lengthy communication from a brother whom we have never had the pleasure to know in the way of a personal acquaintance. In his own church he is favorably regarded as a gentleman, a Christian, and a scholar. At times the light of his brilliant genius shoots out its luminous rays into literary circles beyond the proper compass of his denominational periphery. Generous in his disposition, he is anxious that *his* individual apprehension of the truth should make others free from error. No wonder that he took up his patent pen to strike the shackles of bondage from one of the contributors to THE MICROCOSM! His letter is an amusing piece of literature. With the mingled emotions of pity, perspiration and petulency, the author interrogates us in the following language: "Is Wilford Hall the Messiah, that the people of this country should be carried away by the "*Problem of Human Life*"?

Let us look a little at the above question: Let us analyze the startling interrogatory. The latter part contains an admission which does honor to the brother's faculty of observation. His language expresses a literal and historic truth. The people

are carried away by "*The Problem*"—away from scholastic bondage; away from the wave-theory of sound; away from the monstrous insult which intimates and teaches a monkey parentage for man, and mocks the fondest hopes of human beings with the miserable moon-shine of molecular immortality; away into that more salubrious clime where *Substantialism* is the watchword of science, and the objective nature of invisible entities the battle-cry of truth's embannered hosts.

But what about the direct interrogation:—"Is Wilford Hall the Messiah"? The question must have been conceived in doubt, and brought forth in the painful birth-struggles of mental anxiety. We think of the poor Baptist in his dungeon-cell, and commiserate the brother in whom history seems about to repeat one of its most cruel chapters of tragic romance. Is Wilford Hall the Messiah! The question is one of solemn import, and calls for serious consideration. We have given it such consideration; and now, after several weeks of cool and candid thought, we announce our decision in the negative. Wilford Hall is not the Messiah; yet he has done more in science than any other living man toward silencing the profane and preposterous intimation of materialistic evolution that the precious Messianic blood which flowed on the altar of the world's redemption had previously descended through the veins of an ape. No, my dear brother, Wilford Hall is not the Messiah; yet, judging from the obvious fact that "the gathering of the people" is around his standard, he does appear as a sort of scientific Shiloh, and, as such, he stands out in bold relief and beautiful contrast with those who are belittling themselves in their attempts to bespatter the spreading fame of one whose scientific shoes their rickety theories are not worthy to unloose.

3. Number three is a remark from one of the rising scholars of this country. At present he fills an important chair in one of the colleges of our land. Higher honors are awaiting his arrival. Indeed, we would not be surprised to see him embrace the new philosophy, exercise the splendid powers of his intellect in the demonstration of its superior claims, and thus write his name in the more *substantial* characters of scientific truth. At present he is reading Tyndall's latest work on Sound in connection with Wilford's new treatise upon the same subject. Before commencing his present search for the truth, he informed us that "Hall is fighting a lost battle; the emission theory of sound was advanced years ago, and has long since been abandoned." At the hearing of the above, we were dumb with silence because our erudite friend had spoken. We went to our library,—our "Armory of David," containing something like "a thousand bucklers, all shields of mighty men," but found nothing to confirm the correctness of his sweeping and stunning declaration. Having but little confidence in our own infallibility, we wrote to men of more extensive reading. Some of them have answered us. We have sent for new books. In the meantime we have settled down in the belief (1.) that our friend was mistaken; (2.) if correct, it does not follow that the corpuscular theory is wrong; (3.) if the corpuscular theory is wrong, it would not be logical to conclude that the wave theory is right. Hall may be fighting a lost battle; but a lost battle does not necessarily imply a lost cause. Might has often had a temporary triumph over right; and popular clamor is the mighty element in a sham battle. Such clamor has kindled the fires and fanned the flames for a "noble army of martyrs." There was a "lost battle" at Constance, when Huss, in prophecy, proclaimed the ultimate triumph of evangelical truth. A lost battle? We deny it. It was a glorious victory. The principle for which the hero died was not buried under the ashes of the brave Bohemian, but arose with the flames that illumined the pathway of his noble spirit to the Fountain of Eternal truth. So do we deny that Hall is either fighting a lost battle, or a battle to be lost under his leadership: and we shall persist, with accumulative emphasis, in this denial until some one shall step forward and point us to the historic field of scientific conflict where the standard of substantial corpuscular emissions in acoustics went down before the undulatory banner *waved* by some "prince of the *power of the air*."

THE FREEDOM OF THE WILL.—NO. 2.

BY PROF. I. L. KEPHART, A. M.

"Will," says Dr. Reid, "is an ambiguous word, being sometimes put for the *faculty* of willing; sometimes for the *act* of that faculty, besides other meanings. But *volition* always signifies the *act of willing*, and nothing else." When we assert that the *Will* is free, we mean that the faculty of the human mind which is denominated the *Will*, is free to determine what the individual will do, and that his *Will* is free to put forth volitions in accordance with the choices which the will-power of the individual makes.

"Freedom," says Coleridge, "is the essential attribute of a *Will*, and is contained in the very idea that whatever determines the *Will* acquires the power to do so from a previous determination of the *Will* itself. The *Will* is ultimately self-determined, or it is no longer a *Will* under the law of perfect freedom, but a nature under the mechanism of cause and effect. We need only to reflect on our own experience to be convinced that the man makes the motive, and not the motive the man. What is a strong motive to one man, is no motive at all to another." Motive and appetite are the *Will's* solicitors and the *Will* is the controller of the motive and the appetite.

The second question in our previous article reads as follows: "Must not the evil-minded man, of necessity, seek to harmonize his conduct with his predominating lower nature?" Answer: He must *not*. There is no necessity, *ab extra*, that compels him to do so. The fact that when he does the wrong which his evil nature impels him to do, his conscience condemns him for the act, is proof conclusive that, in spite of the powerful constraints of his evil nature, he was free to refuse to do the wrong, and that he could have successfully refused to do it. This must be so, or there could be no lashings of conscience for having done the wrong. If by "*the evil-minded man*," we mean one in whom has been developed such a powerful propensity for evil that the individual is no more capable of abstaining from doing the evil than water is capable of refusing to run down hill—and that he as naturally and unavoidably "seeks to harmonize his conduct with his predominating lower nature" by doing evil as a lump of lead falls through a vacuum, then we admit that he cannot do otherwise. But, in that case, his Will is no longer free, its natural freedom has been sacrificed. It is then no longer under the law of freedom, but under the law of cause and effect. Habit has been confirmed into an unchangeable second

nature, and the individual's liberty, and with it his day of grace, is gone. But in that case he experiences no remorse of conscience for continual wrong doing.

Should the question arise as to whether or no such an individual is responsible for the wrong he does after having sacrificed his freedom, I answer, certainly he is responsible (as said in my answer to question 1.), just to the extent that he, in his previous life, by yielding to evil influences when he could and *should* have resisted them, brought about such a development of a preponderating evil nature that it finally bound him in its chains. When the motives to do evil conspired with his appetites, and solicited his *Will* to *choose* and *do* the evil, then his *Will, as the controller of the motives and appetites*, should have asserted its authority, and in its sovereignty, should have repelled the solicitors as it could have done. That he at one time possessed this power he must admit. To deny it is to belie his own nature and consciousness. The fact that he did not use this power in the right direction, and as a consequence became bound by the unyielding chains of a predominating evil propensity, renders him criminally guilty, —both for his condition and for all the acts of wickedness he commits. Of course, if there were a case in which the *Will's* power to resist evil influences were resistlessly borne down by an external overpowering diabolical agency, in that case there could be no guilt.

Question 3. Does not the man who is evenly balanced in his tendencies toward good and evil, invariably adjust his conduct to the good or the bad influences by which he is at the time surrounded?

Answer: I think he does. By "the man who is evenly balanced in his tendencies toward good and evil," must be meant a man who is as ready to do the right as he is to do the wrong, and *vice versa*—a man who is neutral or indifferent as to the right or wrong. But no man has a right to be in that condition of mind, or occupy such a position toward right and wrong. And the fact that in the beginnings of his wrong-doing his conscience lashed him, is evidence that he was not placed by his Creator in such a state of indifference, but has brought himself there by *the abuse of his free will.* It is admitted that the individual who is in such a state of mind as the question supposes, would be the creature of the good or bad influences that would for the time surround him; but he is censurable for having, by the abuse of his free will, brought himself into that state of mind. The man's mind being evenly balanced toward good and evil does not excuse him for yielding to an evil inducement; and the fact that such a one suffers remorse of conscience for doing wrong is an evidence that he is not excused, and does not even excuse himself. The fact that his mind was evenly balanced, and that he was actuated by an evil influence, does not exclude self-determination, but implies it—implies that the individual, though actuated or induced to do the evil, was not compelled thereto or acting under the law of external causation.

Question 4. If freedom of the will be predicated of every human being, are not such phrases as "extenuating circumstances," "restraining influences," "ungovernable impulse," meaningless expressions?

Answer. Not by any means. The fact that the Will is free does not imply that an individual may not be led into doing wrong by craft and cunning, and by false argument. The Will's being free does not imply that the individual, by reason of an imperfect judgment or dullness of perception coupled with cunning, powerful solicitations from without, may not be led into the commission of great sins; and that, too, when it was his duty and his privilege to have exercised a closer discernment, and a firmer resistance to the evil solicitations—and thereby, in the exercise of his judgment and free will, have avoided doing the wrong. Nor does it imply that men while in the flesh and subject to the weaknesses and passions of the same, may not be overtaken in an unguarded moment by an impulse, which, for the time, is ungovernable, and commit sin, which, by being more carefully on their guard, they might have avoided. Now the commission of sin under any, or all such circumstances, is, in the eyes of a just judge, somewhat excusable. The surroundings were against the moral agents. The circumstances were "extenuating." The unfortunate individual feels in his own consciousness that, while he is guilty of having done wrong, and must repent and seek forgiveness, nevertheless his having been deceived or over-persuaded, does modify the degree of his guilt—that he is not as culpable as he would be had he deliberately chosen to do the wrong.

Question 5. Do not men do again that for which their consciences have already chastised them? Why do they act thus if they are free to act otherwise?

Answer. They act thus, not because they *cannot* act otherwise, but because they *will not* act otherwise. It must be remembered, as stated in my first article on this subject, that the freedom of the Will is *only a limited freedom.* When, as in this question, we admit that the man "is free to act otherwise," we mean that he is free to abstain from doing again that for which his conscience has already chastised him, and thereby avoid another such chastisement; but he is *not* free to do this and still secure the immaginary and coveted good which he secures by doing again the bad deed. Conscience has often chastised the drunkard for his conduct; but while conscience warns him not to drink again, and thereby avoid an additional chastisement, the fiery appetite with which he has bound himself clamors for gratification. He must either forego the gratification of appetite, or again do violence to his conscience. Right here the sovereign Will must decide. Appetite is the Will's solicitor; the Will is appetite's controller, or at least is designed to be; but too often the Will surrenders its throne to appetite. If this surrender becomes complete, and appetite is permitted completely to entrench itself on the throne, the Will's liberty is taken away, and the individual's actions are then determined by the law of cause and effect—appetite the cause, a debased an ruined soul the effect.

Questions 6 and 7 will be answered in the next MICROCOSM.

LEBANON, PA.

MODERN PHILOSOPHY AND CHRISTIANITY.—No. 2.

BY PROF. JAMES W. LOWBER, M.A., Ph.D.

It is very evident that modern philosophy has had extreme tendencies. On the one hand, it has developed from an extreme realism into naturalism, sensationalism, materialism, atheism; on the other, it has gone from an extreme idealism into mysticism, spiritualism, transcendentalism, pantheism, rationalism.

There is no antagonism, however, between a

true philosophy and a pure religion. They are both children of the light, and are designed to go together. "It is in pride, in reasoning pride, the error lies." Eclecticism, in a proper sense of that word, presents to us a true philosophy. "Philosophy," says Morell, "is the science of first principles—that, namely, which investigates the primary grounds, and determines the fundamental certainty of human knowledge generally." Max Müller says "that the first problems of what we call philosophy, were suggested by religion." Cousin insists that there is much truth in all the systems of the past, or they would not have had the influence which they have wielded over the human mind. Eclecticism finds the truth in the golden mean between the extremes which have agitated the philosophical and religious world in all ages. It very properly becomes the arbiter between science and religion. It studies, with the true philosophic spirit, God's will as it is impressed upon all nature and revealed in the Bible. It is like a certain naturalist who could see God in every flower. "The heavens declare the glory of God, and the firmament showeth His handiwork." The beautiful stars that nightly glitter in the sky,

"Forever sing as they shine,
The hand that made us is divine."

With this spirit, let us examine for a short time some of the great problems with which philosophy has so long concerned itself. "In the beginning God created the heavens and the earth." This introduces us to the beginning of the Bible and to the commencement of all science. Many ancient philosophers believed in the eternity of matter. Modern science has demonstrated the fact that matter was created. In this, modern science and the Bible are in harmony.

"God created the heavens and the earth." The Bible reveals the existence of God, and leaves philosophy to demonstrate its truth. "The invisible things of Him from the creation of the world are clearly seen, being understood by the things that are made, even His eternal power and God-head; so that they are without excuse." (Rom. i:20.)

John Stuart Mill says that the Theist, in his debates with the Atheist, must stick to the argument from design. Dugald Stewart gives us the following concise propositions: First, "Everything which begins to exist must have a cause;" second, "A combination of means conspiring to a particular end implies intelligence." These are the propositions of the eminent Dr. Reid: First, "That design may be traced from its effects;" "That there is evidences of design in the universe." Evolution cannot exceed involution. In this world, we have personality, thought, wisdom, goodness, and moral law, in effect. These things must have existed in the antecedent cause. Therefore: The author of this moral universe is a law-giver who possesses personality, thought, wisdom, and goodness.

When the wisdom-loving geologist studies carefully the six periods of geological history, and compares these with the six days or periods of Genesis, he is overwhelmed in the contemplation of an amazing harmony. I once heard an eminent professor deliver a lecture in Boston, in which he insisted that a miracle is an impossibility, and that man was developed from a lower species. A gentleman asked my opinion of the lecture. I stated that the Professor had made a great mistake; that men are not now developed out of monkeys; that the first man was a miracle, whether developed from the monkey, or made out of red earth; that I preferred the last position, because man does not return to the monkey, but to the earth from which he came.

"In the image of God created He him, male and female created He them." We have here the divine origin of marriage. The science of sociology teaches us that the nations which have observed the true monogamy of the Bible have prospered, while God has swept those which have adopted polygamy with the very besom of destruction. One modern skeptic has much to say about the rib story. That man lost a rib, is shown from the fact that you seldom find a man satisfied until the lost is found. The science of sociology and the Bible are in perfect harmony with regard to the family and its relation to society.

(*To be continued.*)

LANCASTER, KY.

THE LAWS OF MIND.—No. 3.

BY REV. J. W. ROBERTS.

The axiomatic truths and principles heretofore laid down in these papers lie at the base of all investigation, and can no more be severed from any system of true science than can the foundation be taken from a princely edifice, and the structure still stand. While all truth is indestructable in its very nature, and must, of necessity, have an eternal inheritance, yet, relatively, some facts are of more importance than others, and enter more deeply into the constitution of things about us; and, of these, the one upon which these inquiries first take hold, is predominating in its nature, scope, and universal prevalence in the domain of material substances, namely, the *inertia of matter*. It is the property of matter which builds and yet bars the mechanics of the world. It enters into the calculations of every inventor or constructor of machinery. It erects an impassable barrier to the accomplishment of perpetual motion by devices of human ingenuity. Dead centers, dead weight and loss of power, have largely, if not exclusively, their focus or center of being in this attribute of matter. In a word, this is a radical, fundamental and broadly underlying principle, whose outreach is as wide as Nature, and as deep and high as the universe. Its relaxless grip holds every atom as well as every world in space. From its dominion nothing escapes. No captive is released from its inexorable chain. Its empire is wide as the boundaries of the universe, and its reign as enduring as the "eternal hills of God."

As already stated, Nature is *one*. Multitudinous as are her manifestations, reaching from the grand to the gloomy, from the sublime to the minute, she is yet a *unit*. Clothed in perpetual light she often seems to wrap herself in darkness and obscurity, and veil in impenetrability the hidden arcana that lie in mystery about her great throbbing heart. We see at last, in a measure, the arteries that carry the blood from the heart to the extremities of her person, and the veins that gather and carry it back, but the heart itself remains hidden from view. But we know she is true to herself and "true to truth." Hence, as laid down in the axiom, *no one truth in Nature will conflict with or be contradicted by any other truth*. Once there, we find our feet firmly set upon the rock of truth in Nature's realm; we are safe there against any assault, come whence it may. We are only in danger of losing our way, of being misled, of falling into error, or being

dislodged from our position, when we leave the solid rock and enter upon the unstable bases of hypothesis or speculation. An *inherent* and *fundamental* quality of matter being *inertia* or *absolute helplessness*, any theory which assumes that matter has qualities contrary or antagonistic to this *underlying* truth, *is false on its face.*

It is departure from this safe anchorage and losing sight of this great fact, which lead so many great men into radical errors. It is forgetfulness of this guiding principle which renders so much of that which goes under the name of modern science a "delusion and a snare" a mere chimera or figment of the brain.

It is a matter of astonishment and profound regret that so many men of eminent ability and great learning should waste their strength and squander their time in the pursuit of phantoms, when, if rightly guided and employed, they might build enduring monuments of fame and lift science up upon a throne of enduring glory which should be brother to immortality. Let us apply principles.

Life is energy. It is, therefore, the opposite of *inertia.* Hence, that which is inherently *devoid of energy cannot impart it. Life cannot proceed from matter any more than something can come out of nothing;* and for precisely the same reason. This statement is repeated here purposely, because the writer has received communications which indicate that those who are interested in this subject and these papers are yet desirous of more light at this point. The effort to condense and say the most in the fewest words may have been carried to the extreme of reaching only the close student, who has time to devote to the subject; whereas, it is desirable to benefit those who are less advanced but earnestly seeking for the truth with such facilities as lie within their reach. If, therefore, there should seem to be a restatement of principles in a new form to the advanced thinker, let such remember that there are those who feel the need of just this line of argument to place them fully in possession of the truth they are seeking to know.

It will at once appear from the foregoing axioms that all shades of hylozoism are phantasms that cannot possibly have any root or groundwork in fact. It was doubtless while looking at the subject from this impregnable philosophical standpoint that Prof. John Tyndall exclaimed of such fanciful dreams, that they were "absurd, monstrous, and fit only for the intellectual gibbet." He never said a wiser or truer thing, or one which will stand the tests of time and criticism more surely. In view of these facts it is matter of surprise and astonishment that this same learned and able scientist should put himself on record as declaring that in matter he saw the "promise and potency of everything." We might well let one of these declarations stand over against the other and nullify it, as well as neutralize the influence of one however eminent, who, under the bigoted and sneering environments of what is termed physical science, should permit himself to be led so widely astray.

Against this last quoted declaration of Prof. Tyndall every piece of power machinery in the world enters its emphatic protest. Put life and intelligence in matter, and it is no longer inert. With such a combination not only is perpetual motion a thing of easy attainment, but the mechanism of the globe is at once revolutionized. Every balance wheel or similar device, every check and counter-check in machinery, every application of power to overcome inertia, is a protest louder, stronger and more enduring than any that can be uttered in words, spoken or written, against the "monstrous absurdity" of this proposition. There is, there can be, no *life*-"potency" in matter, much less intelligence. It cannot be expected that the writer, limited as he is in space, shall be able, even if it were desirable, to follow every scientific crank who pursues a will o' the wisp over the bogs and amidst the debris of decay, guided only by the phosphorescent light of putrefaction, which, at best, can give nothing but the "promise" of death. Time is too valuable to be thus squandered.

It is true we know but little of Nature. She is charry of her secrets, and often locks them with a hidden key which requires the most diligent search to find. But she never yields up a secret to deceive or mislead. She is always true to herself, and never contradicts a single utterance once made. And herein is our safety; what we know can never be taken from us, it abides forever, and we can build upon it with absolute confidence. There is no conflict in Nature; that is all confined to men, and *grows out of inadequate knowledge of facts and principles on their part.* Another thing is equally true: men are often deceived by appearances. *There are primary and secondary causes, and the effect of a primary cause sometimes becomes a secondary cause;* and unless men are careful in their search after truth to analyze every fact at each stage of progress, they may become bewildered or lost. Let us illustrate:

A fine edifice is in course of erection, and the workmen engaged upon it move with the utmost precision, each in his appointed place. A philosopher who desires to inform himself in matters of architecture comes upon the scene and notes with care the process of construction. He sees the mason place the stone and brick properly cemented, and the carpenter his timbers carefully joined and adjusted. Each brick, stone or piece of timber exactly fits in its appointed place, and the building grows apace. These men do all this work *apparently* of their own motion and by their own knowledge; and the philosopher discovers no other force of intelligence besides them; so he concludes, with every semblance of correct reasoning, that the edifice is the exclusive product of the builders he beholds at work upon it. But is that a correct conclusion in point of fact? Far from it. Before a pick or a shovel was on the ground to commence the excavation for the foundation of the superstructure, it was planned and matured in every detail by the architect. Before a stick of the timber entering into it was cut down in its original forest, it may be, or a stone for its walls had been dug from its native quarry, the entire building, from base to capstone, had its existence in the mind of the architect. He told the mason and the carpenter how and where to place each stone, or brick, or piece of timber; and they were but carrying out his directions, when their orderly and clock-like work deceived the philosopher, and led him to a false conclusion, simply because he *judged from appearances and not from reality.* His investigations extended no further than to secondary causes, which are misleading unless well understood. Nothing could appear more reasonable to the beholder than that the mason and the carpenter were the originators of the structure they were putting together; and the deluded philosopher was just like hundreds who attempt to solve the great problems of Nature, but are deceived as he was by outward seeming.

Here, another important law may be stated:

Secondary causes never originate. In fact it may be seriously questioned whether they are anything more than *executors*, though termed causes. An illustration may elucidate the point:

A mighty river rushes with resistless force toward the ocean, bearing upon its bosom the largest ships, freighted with human life and the rich commodities of commerce. It is an object of wonder and admiration. The scientist beholds this gigantic effect, and proceeds to seek its cause. He traces the stream to its source in the distant mountain, finds it to be a little bubbling or trickling spring of water coming from out the rocks, perhaps less than his smallest finger. He stands amazed and abashed, exclaiming: "What stupendous results from so insignificant a cause!"

Is his conclusion correct and in accordance with the facts? By no means. That little fountain is not the river, and only its source in a qualified and accommodated sense. There are, perhaps, hundreds and even thousands of other little springs, the so-termed heads of other streams, all of which verge together and combine their waters in the one channel, which, becoming the receptacle of all, is swelled to its vast proportions, aided by the rain that falls from the clouds above. But do all these streams and the rains united make the river? Only in a secondary sense. Back of these lies the great law of gravitation, which draws all these waters, whether direct or lateral, to a common center, and brings down the rain from the clouds. But for this law the crystal waters would forever rest in their fountains amidst the rocks of the mountains or at the hillsides on the plains, and the rain would never leave its azure in the sky.

And do the springs, the rains and gravitation produce the river? Only as instrumentalities. Design is as manifest in the construction of that river as it is in the construction of the edifice in the other illustration. Design necessarily implies intelligence; and neither the springs, the clouds, nor gravity possesses intelligence. They are but the masons and the carpenters, and back of them is the architect who planned the construction of the majestic stream.

Another thought may be thrown in at this point. *That river appears to be a force in itself;* but yet it is not, but is utterly helpless. True, that though by absorption and evaporation its waters are constantly being taken up, its volume ever increases as it flows onward, growing in grandeur, compass, and power; and for all this and more that might be said, it cannot add a single drop to its stores or increase its treasures by the smallest fleck of the morning's mist. It is entirely the result of causes outside of and above itself, and upon which it has no controlling influence. In this respect it is in union with all the phenomena of Nature.

These illustrations, with the principles lying back of them, indicate two things. 1. The deceptive character of appearances. 2. The inadequacy of secondary causes to originate the plans they execute.

Before passing from this line of thought it may not be out of place to add another illustration. The chemist can make a grain of wheat or corn, or other vegetable seed, perfect in form, size and constituent elements. It will pass in commercial transactions, will support and sustain animal life —in short is a perfect grain so far as *matter* is concerned; *but there is no life in it.* A million of them would not produce a single plant. If matter has the "promise and potency of everything," why is this? Why does not that perfect grain produce life? Because life is not in matter, and a secondary cause cannot put it there, no difference how wise or intelligent it may be.

These examples are not all new, but they are forcible and serve to make the truth impressive.

SPIRITUALISM EXPOSED.—No. 2.

BY CAPT. R. KELSO CARTER.

Besides the famous double-slate writing, so fully explained in the former article, Mr. Slade gave us several exhibitions of spirit power. When we first took our seats Slade called attention to the fact that his feet were placed outside the table; but almost immediately one foot was removed, and with it raps were executed at different points under the table. The other leg remained in position to deceive us, and the trained performer never showed by the least gleam of eye or tremor of shoulders that his foot was in motion.

Herein lies the completeness of the deception to the ordinary observer. The medium appears intent on wiping a slate, is talking easily about spirits, &c., and at the same time uses his feet to do various things under cover of the table, entirely disarming suspicion by the perfect naturalness of his visible motions. This requires considerable practice. The novice will always betray himself by some motion of the upper body, or change of expression in the eye. Again, while relating some of the wonders of the famous seances in Leipzig before Prof. Zöllner, we distinctly saw Slade write on the slate. What he wrote was the word, Yes; and he expected to write it undetected, but the eye accustomed to such deceptions readily observed it. The conversation was then changed, and we were requested to ask a question of the spirits. This done, the slate sound was again heard, and the slate drawn out, when the word yes appeared as an answer. He then called attention to the fact that the small slate pencil was always found precisely on the end of the last mark in the word. These little things help the general effect greatly. A cross mark was made in the slate, the small pencil placed upon it and a pen holder laid on the slate. We were told that the spirits might throw that penholder anywhere; and in a moment down it came *on top* of the table, while Slade brought out the slate with the little pencil precisely on the cross mark—showing of course that he could not have thrown it. This was accomplished very easily. He put the slate on his knee under the table, picked up the pen holder by one end, and by a little flirt of the wrist and fingers, which anyone can acquire in a few moments, he threw it up so that it fell on the table without letting his hand appear to us; and then instantly picking up the slate from his knee, it was exhibited with the little pencil undisturbed. Suddenly while our attention was drawn to the pen holder, a chair, standing at the unoccupied side of the table, ran into the air without a sound, and nearly struck my shoulder as it fell over at my side. Just here I wish to emphasize the unavoidably startling effect such things have to one who does not see how they are done. This effect once begun, inevitably increases as the seance progresses; and with this feeling in the mind, the individual becomes a prey to the most ridiculously simple feats. For the moment this chair startled me, and the man who saw and had seen no deception would always be a thoroughly scared man. But it was the simplest thing imaginable. Slade reached out with his left foot and gave that chair a lift, while our eyes were upon the pen holder, and immediately rose

to his feet, in feigned astonishment, in order to aid the effect and at the same time help him to get his foot back unobserved. He then asked the spirits if they would raise my friend from the floor, and on receiving a favorable yes, as above, he placed his right hand on the back of my friend's chair, his left hand bearing hard on the table to steady himself, crossed his right leg over his left knee, hooked the right foot beneath the lower round of the left side of the chair, and lo! my friend, chair and all, rose up a foot from the floor, and then dropped heavily. To distract my attention from himself, so that I might not see the evidence of the exertion in the side of his face and neck, he told me to watch my friend; and of course I did so, but could not see the foot under the round as my friend's body intervened. This feat (?) requires some strength and practice, and the right instep should be well covered to prevent the round of the chair from bruising the flesh. On the first attempt I succeeded in partly raising my friend, but was obliged to refrain from lifting him owing to the pain in my foot. One more wonder will suffice for Mr. Slade. He said the spirits often take an object bodily away; and to illustrate it placed a paper box on the slate, slid it under the table and at once exclaimed: "I declare it's gone already," showing the slate with nothing upon it. "Look under the table," he said. We looked but not a sign of the box could be seen, when, as we raised our heads above the table, he brought up the slate with the box upon it, saying: "There it is back again. Wonderful, isn't it?" This is explained on the principle of the child's act; the hand put over a marble and the words "Now you don't see it," followed by "Now you see it," as the hand is removed. All Mr. Slade did was to turn the slate over, holding the box pressed against its under side with one finger, and afterwards to turn it right side up again. Shades of the magicians! Yet these are the "*scientific facts,*" that absorbed the attention of the learned German professors for over fifty sittings, gave birth to that extraordinary book "Transcendental Physics," and led the Rev. Joseph Cook to class them in the same category with the supernatural movements of Jesus Christ after His resurrection. Well may the great and only Barnum declare that, the people like to be humbugged. Most men can reason to a correct conclusion if their premises are sound, and the great majority of fallacies lie in false premises ingeniously framed to avoid detection. When Zöllner tells us that the spirits tied knots in a string, both ends of which were drawn through a hole in a card, tied and sealed with wax, the card placed on the table in full sight, and the long loop allowed to hang out of sight, he honestly believed that all the conditions were stated and that he and his friends saw them all. Here lies the fallacy. *They did not see them all. Before* the second end of that string went through the card, those loose knots were thrown in that cord by a deft motion of the practised performer, which motion entirely escaped their observation.

The passing of a conch-shell through a table and its becoming hot in the transition, is one of the elementary principles of sleight of hand. One of the commonest tricks of the magician, one of the smallest, not considered to be of any importance, and which no professional would think of giving a place in his performance, is to pass an object like a half dollar, or shell if you please, through a table. It is a perfect deception to the eye, and the pass which accomplishes it *can not* be seen. Add to this the still more common trick of substituting another object exactly like the first—in this case another shell *previously warmed*—which is held concealed in the palm of the hand, and you have this miserable affair, which Joseph Cook coupled with Christ's passing through a door. Neither Prof. Powell nor myself have seen Slade actually perform the last mentioned tricks, but we will readily engage to explain precisely how he accomplishes them at any time that he may choose to perform them in our presence.

In a third and concluding paper I will give a clear exposé of the well-known medium, Charles Foster, in his reading of hidden questions, and the startling blood-writing on the arm.

PA. MIL. ACAD.

ELECTRICITY AND SOUND.

A WILFORD HALL, Ph. D.—*My Dear Sir.*—I know but very little about physical science, but there is something about sound that I wish to speak of as having occurred to my mind; and lest I should fall into error, if you will allow it, I will put my thoughts in the form of inquiries.

You have undoubtedly forever settled the question as to the falsity of the wave-theory of sound, and I think you have with reasonable clearness demonstrated the fact that sound, as well as other imponderables, is a substance. Your theory of the tramsmission of sound, or the manner in which it is conveyed from the generator to distant places, is perfectly beautiful. I refer to your idea of sound leaving the generator in the form of large molecules which give off smaller ones as they pass along, and these still smaller ones, and so on until they become too minute and too few in number to affect the sense of hearing. But from your answer to the enquiry why sound will not pass through a vacuum, and from other portions of your writings, I infer that you think *the air* is the *immediate* conductor or vehicle of sound. Now if the teachings of Dr. B. T. Kavanaugh and other writers are correct, our atmosphere is at all times heavily charged with electricity, which is generally in motion, carrying the air along with it, thus producing wind and other meteoric phenomena. If this is true may it not be that the *air* has nothing *directly* to do with the *transmission of sound*, but that *electricity is the true conductor*, and the air and other substances being mediums through which electricity passes with greater or less rapidity they are only *mediately*, but *not immediately*, the conductors of sound? Scientists tell us, not only that the atmosphere is always heavily charged with electricity, but that it is very often in motion, different currents moving in different directions and possessing opposite polarities, some positive and some negative. If this is so and if it can be made to appear that *electricity* is the *true conductor of sound*, then will we not be able to explain many things about the motions and "interference" of sound that are at present very mysterious? For instance, in the case of the fog-horn, the sound of which can be distinctly heard at a station fifteen miles off, while at another station only three miles off in the same direction it cannot be heard at all, would it not seem more in accordance with well-established facts to suppose that the sound is conveyed from the horn, say, by a current of *negative* electricity, and before arriving at the near station it comes within the influence of a current of *positive* electricity passing through the upper regions of the atmosphere, and is attracted by it carrying the sound with it over the station, and after passing

beyond this influence again descending towards the earth, causing the sound to be heard at the distant station?

Again, in the case of supposed "interference" reported in the December number of THE MICROCOSM by Prof. J. S. Large, if electricity of one polarity was carrying the sound to him, and while he was listening a body of electricity of the same polarity should have passed—either suddenly as he first says, or gradually as he says afterwards—over where he was situated, *repelling* the sound-bearing current away from him, would it not have produced precisely the changes he describes?

Are not the observations of E. Mathers, Esq., given in the January number of THE MICROCOSM more fully demonstrative of the fact that *electricity is the real conductor of sound, and that the air has nothing whatever to do with its transmission, only as it is the medium through which the electricity passes?* Notice some of the facts given. Mr. Mathers hears "the hoarse whistle of the boats" on the Ohio river, a distance of eighteen miles. He says, "I notice that this never happens except when there is no wind, but in a calm still evening, or at night when the noise of our village ceases. I often hear them quite distinctly. I observe, too, that a change of weather occurs invariably just after hearing them; [I wish he had told us what kind of change,] thus the hearing of the sound, and a sudden change in the atmospheric conditions have come to be associated in the minds even of the *children*, who, on such occasions, will remark: 'the weather is going to change, I hear the boats.'" Now, I believe that it is generally admitted that electricity has much to do in producing the changes of the weather. Dr. Kavanaugh teaches that these changes are produced *wholly* by electricity. If he is correct, then let us suppose that the air in the upper regions, over that part of the country between the Ohio River and the residence of Mr. M. is getting "dry and thirsty" and currents of positive electricity are *beginning* to form, inducing the formation of a dense body of negative electricity in the air near the ground. In the *formative stage* of the positive currents above, the attraction is not sufficient to produce any lateral or current motion in the negative electricity below, consequently the lower strata of air, although heavily charged with negative electricity, is motionless—there is no wind—and this stationary body of electricity, in a high state of tension, is in the best possible state to act as the conductor of sound, and consequently he hears "the hoarse whistle of the boats," which he could not hear under other circumstances. As soon as the positive currents above have become sufficiently intensified to force the negative electricity to leave the earth and ascend to them a general atmospheric disturbance takes place, and a change of weather ensues. Does this not fully explain all the phenomena observed? And is it not more in accordance with admitted facts than any other explanation that may be given?

When the air is pumped out of the receiver of an air-pump it brings all the electricity with which it is charged along with it, and consequently there is nothing to conduct the sound and bring it in connection with the external electricity, and therefore it fails to reach the ear.

One more query: Dr. Kavanaugh teaches that positive electricity emanates from the sun, and that negative electricity is "native to the earth," and if this is the case may it not be a wise provision of our Heavenly Father to make *negative electricity the true conductor of sound?* If so, is there not an important idea here worthy of deep and close experimental study in reference to the conduction of sound in the telephone?

But I have asked questions enough for one time. Now Doctor, if you do not think me troublesome, and consider my questions worthy of your attention, I would be more than glad to have your views in relation to them through your invaluable journal, THE MICROCOSM. In the meantime believe me to be very sincerely and fraternally yours,

ISAAC A. TOWERS, M.D.

THORNTON, Texas.

REPLY TO THE FOREGOING.

The views of Dr. Towers, as above communicated, are very beautifully and clearly expressed; and, like many other theories, his is all very nice and symmetrical till it comes to be analyzed and critically examined.

It will be noted that Dr. Towers, like Dr. Kavanaugh, takes for granted the actual existence of two electricities—*positive* and *negative*—in order to explain the problem of soundless zones which are observed at certain distances from fog-horns, water-falls, etc. As no such varieties of electricity, however, have any existence in fact, so far as yet known, would it not be simpler to assume directly that these soundless zones of atmosphere are due directly to changes in the grain-like texture of the air itself, as first suggested in the *Problem of Human Life* at pages 257–266, and onward?

'Tis true electricity (not "positive" nor "negative," but simple *electricity*,) may play an important part in changing the texture or grain of our air, and in thus giving direction and force to sounds, in glancing them over certain masses of unfavorable air, etc., and so also may heat and cold; but it is surely arbitrary to ignore the texture of the air itself, as a real conducting substance and which we know to exist, by assuming two electricities of opposite natures of which we know nothing. Especially is it reasonable to assume a grain-like texture in air, since we know positively that such grain exists in wood and that in one direction, or with the grain, sound travels with much greater facility than across it. This has been proved by observation.

But, the radical error in Dr. Tower's theory is, the assumption that the electricity in the air, and not the air itself, conducts the sound. Had he thought for one moment that *glass* is one of the very best conductors of sound while it will not conduct electricity at all, he would have solved his own problem. The fact that sound travels freely through bodies that refuse to conduct electricity shows that the texture of the body itself forms the conducting medium, and not the electricity that the body contains. We do not deny but that the substantial currents of electricity may combine with the substantial sound-pulses, in a suitable conductor for both substances; and thus, that the former may assist the latter, as in the case of conducting sound along the telephone wire. We have no doubt, but that the electric current helps such sound conduction; yet sound will travel through the same wire 19,000 feet in a second, when, the wire is wholly disconnected from the battery and when no electric current is passing through it. But clearly, the *glass*-conductor of sound, just referred to, settles the question and is a conclusive answer to Dr. Tower's inquiries.

Finally, we have no objection to a theorist's

trying to explain observed phenomena by hypothetic assumptions. We have an acknowledged right in scientific investigations to frame any hypothesis however improbable the facts upon which it is based, as a means of accounting for observed phenomena. If more of these observed facts are explicable by such hypothesis than by any other, and if, in the meantime, the hypothesis itself is not directly contradicted by other well-known facts, then we have a fair right to regard the hypothesis as theoretically true. But, let one single indisputable fact contravene such hypothesis and it falls to the ground as good for nothing, however many of the phenomena in question it may appear to agree with. Let this admitted rule of logic and science be rigidly applied to the various theories of the day, and woe betide the most of them. Plainly, however, those theories which will not bear such a test and strain ought to break down, as they inevitably must.

We give, while on this subject, the following very sensible paper of the Rev. Thomas Nield, which is another emphatic stride toward *Substantialism.*

GENERATION OF SOUND.

BY REV. T. NIELD.

At the back of all sound is energy as the generating impulse. Hence, as perceived by sense, sound is expressed energy. The most elastic metals, woods, etc., are the best media through which to generate sound, because of their vibrational capacity, which implies a capacity for emitting sound-energy.

To produce sound there must be motion, which is the expression of energy in force. Mere motion, however, will not generate sound. A well-oiled piston may work noiselessly; whereas, if the oil fail, there will be friction, and, in consequence, a squeaking sound. In the former case, the energy that drives the engine expends itself in the momentive volume of motion. In the other, it is partly expended in friction, which expresses the energy in emissions of sound, leaving so much less to be expressed in momentum. Air in motion is soundless until it comes in contact with an object. As a rule, the greater the capacity for tremulence of the object struck, the louder will be the resultant sound. In passing through an aperture, there must be a relative proportion between the aperture and the air received to generate sound. And then the quality of the sound depends largely upon the capacity for tremulence of the material through which it passes. Thus we see that the sound must be expressed through motion, and the motion is best expressed through a medium having an emissive capacity.

Energy is the cause of sound, a material agent is its medium, and an unknown substance set in motion by these, is the sound. Here, then, we formulate our definition: Sound, as perceived, is *energy expressed through some unknown substance in motion.* We say, some *unknown* substance. Let us call it *Acoustricity,* and become as familiar with it and with its phenomena under this name as we are with electricity with which it has some things in common, and we shall soon cease to regard it as an *unknown* substance.

The power of any agent as a generator of sound, is its capacity to receive and express sound-energy. A blow upon a block of iron generates but little sound. The same block rolled out into a sheet will, with no greater force in the blow, produce a loud and prolonged sound. In the block the iron neither received nor expressed the energy of the blow. The energy was lost largely in the rebound. The sheet, on the contrary, received and expressed the energy in emissive pulsations.

Different generators will express the same amount of energy in different tones according to their vibrational capacity, as in the case of two bells of different size. The larger bell will produce a lower tone as its vibrational power is lessened. So with sound generated by strings. The lower the tone the fewer the vibrations. So uniform is this law that, whatever the agent may be, the same tone has the same vibrational number. On the other hand, there is a tendency toward silence in the same ratio as the increase in the vibrational number tends toward stillness in the generators. Here we have a clew, perhaps, to explain diversity of tone. The lower the vibrational number expressing the same amount of energy, the stronger are the pulsations, and the larger the percentage of acoustricity to each; while the increase in the vibrations, decreasing the percentage of acoustricity to each, may be continued to a point where the pulsations are too feeble for its emission in appreciable quantity. And the quantity per-pulsation reaching the auditory nerve, produces its specific sensation recognized as tone. The difference in tone is the difference in quality of the sensation produced.

When friction begins in a working engine there is at first a high-toned squeak. As the friction increases the tone becomes both louder and lower. But when there are reversals of motion, the sound is either rumbling or in low-toned thuds. In one case, the force, *i. e.,* the developed energy, is communicated obliquely from one part to the other; and the more obliquely, the more feebly. The sensitiveness of the material to sound impulse (shall we say its capacity for acoustrization?) is such that it emits acoustricity with a shivering tremulence whose vibrational number is on a key near the silence-point. In the other, the force is communicated more directly from part to part, the cause being concussive and direct, instead of frictional and oblique, in emissive action, producing stronger and fewer vibrations. Mere increase of energy expressed makes no variation in tone. The effect is only to emit the acoustricity with greater force and send it further, so long as the vibrational action of the emissive agent remains unchanged.

Tone may be carried up to the silence point where no increased energy can be communicated to the generator; for with the increase in the vibrational number there has to be a weakening of the emissive capacity of the generator, so as to increase its tremulence. And while it becomes weaker, the energy becomes more and more subdivided, until sound expires in feebleness.

Another phenomenon yet remains to be noticed. A low tone is heard further than a high one in which is expressed an equal amount of energy. The reason is that the lower tone has a lower vibrational number, which implies a larger percentage of energy to each vibration, emitting acoustricity with stronger pulsations.

Our next will be on the conduction of sound.

ELMIRA, MICH.

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CHARACTERISTICS OF THE FORCES OF NATURE.—No. 1.

BY ISAAC HOFFER, ESQ.

The difficulty in studying the forces of Nature is, that we can see only the effects of their actions in matter; and hence the mind involuntarily and even against volition, connects moving matter with action. Motion without something tangible moved is almost incomprehensible to the human mind, and hence scientists so frequently assume that matter is the source of activity.*

This assumption makes it necessary that the inherent properties of matter should differ in accordance with its varying conditions in order to explain the manifold operations and results which the activities of Nature manifest.

Already a luminiferous *ether* has been invented which is *supposed* to possess powers, and to serve purposes directly the opposite to all known inherent properties of matter; and yet this ether, according to Prof. Tyndall, is "a real entity—a substance *endowed with inertia*, and capable, in accordance with the established laws of motion, of imparting its *thrill* to other substances." "The motion of this ether communicated to other substances throws them into motion." "It is therefore itself a *material* substance, for we have no knowledge that in Nature anything but a material substance can throw other material substances in motion."

The same thing cannot be two opposite things. Matter cannot be void of power and without form, and at the same time possess the powers and attributes necessary to perform of its own accord all the operations manifested in Nature, and give structure and form to itself.

A substance that is *endowed with inertia*—powerless to act—cannot be a *thrill-imparting* ether. A passive, inert substance cannot be at the same time a self-exerting energy or an impelling power. Impenetrability cannot be permeated by itself. Matter cannot be drawn to the earth by gravitation, and at the same time remain in space as a luminiferous ether. The earth cannot whirl itself around the sun without the power to move, or to change its motion from a straight line when moved. Without life, and without the power to act, matter cannot generate life and organize itself into growing plants and living animals. Utterly void of sense and intellect, matter cannot evolve out of itself, or out of nothing the human mind—a self-exerting, self-controlling energy—that handles with impunity *that source* of its origin, and acknowledges no potency and no power where only passiveness and susceptibility are discoverable. All these irrational contradictions and absolute impossibilities would have to become accomplished facts, if matter was the source of the activities in Nature.

The line of distinction between force and matter—between the moving cause and the thing moved—must be drawn somewhere, for they cannot be both the same thing.

That which acts and causes or produces action is one thing, and that which is actedo n or brought into action is another. The *cause of action* and the *thing brought into action* mark the line of distinction between force and matter. The theory that the unimaginable *ultimate atom*—something at the point of being nothing—should lose the properties of matter and assume the attributes of force, is as illogical and as irrational as the one that makes dead matter an active principle. Matter in a diffused liquid or gaseous state is more easily acted on and brought into action than in a solid or massive state, but the inherent properties of matter are the same in a molecule and in a mountain.

A force of Nature is an impelling power (not simply repelling) invisible, intangible; and its inherent characteristics unsearchable by present known means of research, and is therefore only knowable by its actions in matter.

Moving matter is the first evidence of a force in manifest action, and the motion communicated to the moving matter is not the effect of an outside impulse, as is generally supposed, but the operation of a force of Nature in *persistent exertion within the moving matter*. The oldest known rocks, and all the different strata of the crust of the earth show unmistakable evidence of a changed condition. These formations show that they have either been in a state of fusion, solution, or moved by water; and that heated matter and water have been great factors in arranging and forming the crust and surface features of the earth; but this does not show that material substances were the *cause* of the movements. On the contrary, scientists contend that heat is only a mode of motion: and if heat is a mode of motion, then an *impelling force* operating in matter must have been the *moving cause* in all the igneous actions observable in the earth's crust; *for motion is only the evidence of force.*

Water has only erosive and moving powers, such as are exhibited in the geological formations of the earth, when it descends from a higher to a lower place; but as it cannot lift itself from a lower to a higher level, some other power or force must first elevate it before it can *descend*. The same impelling heat-producing force that causes igneous actions lifts and drives water, in the form of vapor, from lower to higher places, and there it would remain; but gravitation another invisible and intangible force penetrates into every part of the water, and draws it down to the lowest unobstructed level. The large number of minerals and mineral combinations, their beautiful crystals and systematic crystaline structures, found in the crust of the earth, show that there must have been selective, combining and shaping actions—actions that selected, assorted and united different constituents of minerals and shaped them into systematic forms.

Vital action in the building of plants and animals shows in a remarkable degree the selecting, assorting, combining and shaping powers. It shows in addition an organizing and vitalizing power, and a power to enlarge the new born plants and animals, and to develop in animals physical energy, to sustain life for a limited but indefinite time, and to perpetuate species by reproduction.

In all these actions the material is adjusted to the immaterial, the visible and tangible to the invisible and intangible, *the void and without form is assimilated and shaped with unerring precision into innumerable definite forms.*

The inactive is brought into action, the inherently powerless is endowed with internal power, the inanimate is filled with animation, and the senseless is made sensitive. It is therefore evident that action and the power to act, form and the formative, vitality and the vitalizing power are all inherent attributes of forces. Any thing

*See "Mental force the source of activity," in MICROCOSM, Vol. 2, Nos. 2 and 3.

that has form, characteristics and power has received them from forces; and when the forces are withdrawn, or overcome by some other force, so that dissolution takes place, the form, the characteristics and the powers are destroyed. In animal life, where the forms are most complicated, most diversified and most perfect; the characteristics most manifest, and the powers the greatest, the sustaining forces are the most unremitting in action. The immaterial agencies are continually renewing and readjusting the material and giving it character and form, and at the same time are evolving and renewing the physical powers. Force therefore is an entity—a positive something—*an immaterial entity with perfect substantiality in form, in characteristics and in powers.*

The vital part in the germ of an acorn contains the form of the oak tree, it contains the power to build the tree, and it contains the characteristics that compel the tree to be an oak instead of a hickory or any other kind of a tree. If the form, the building power, and that which gives the distinguishing character to the oak was in the material part of the acorn, then the chemist could ascertain all the constituent parts, their exact proportion, and could make an acorn in every particular the same as a natural one; and this artificial acorn would have to grow and produce an oak tree just the same as the natural. There is not a mineral, not a plant, and not an animal that was not made what it is, in its combinations, in its form, in its character, and in its powers by the forces of Nature.

The four-sided lime crystal and the six-sided quartz crystal, the scruby sage and the majestic oak, the crawling worm and the flying eagle owe their forms, their distinguishing characters, and their powers to these forces; and these crystals, these plants, and these animals are only *material representations of the immaterial agencies that produced them.* The invisible and immaterial forms of the operating forces are filled out with visible material substances, and the characteristics and powers of the new creation are determined and fixed by the operating force in each case.

LEBANON, PA.

IS MAN'S RELIGIOUS NATURE AN EVOLUTION?—No. 2.

BY REV. JOS. S. VAN DYKE, A.M.

In reference to those tribes which are said to be entirely destitute of religion, there is conflicting testimony; though, even if they were without "the ennobling belief in the existence of an Omnipotent God" and even without any religious ideas, it would not follow that they were destitute of a religious nature. Besides, whether they may be said to have religion depends upon the definition we give to the term. We are ready to concede that if by religion is meant a reasonably correct conception of a Supreme Being and of accountability to Him, or if the term is intended as an equivalent for moral convictions which impel to purer lives, or if it includes definite ideas in reference to the immortality of the soul, and no ideas except those which are definite, then, undoubtedly, there are many savage tribes utterly devoid of religion; but we insist that if religion is a term which covers belief in, and fear of, mysterious beings more powerful than men, if it may be applied to a vague apprehension of evil consequences as penalties of wrong-doing, if it bears any relation whatever to witchcraft, if it includes ill-defined notions in reference to the continued existence of the soul after death, then savages, probably without a single exception, are unquestionably religious. The universality of these beliefs among savages is conceded by all, even by Lubbock. "Even in his religion, if he has any, the savage creates for himself a new source of terror, and peoples the world with invisible enemies," ("Pre-Historic Times," p. 595.) "It is not too much to say that the horrible dread of unknown evil hangs like a thick cloud over savage life, and embitters every pleasure." (Idem, p. 583.)

COUNTER TESTIMONY.

The Paraguay Indians were believers in witchcraft and in mysterious evil beings. Who is able to prove that these beliefs were not the wretched remnants of a spiritual worship once enjoyed by their more enlightened ancestors? The inhabitants of the southern portion of South America have a vague notion and a horrible fear of a Supernatural Being who is believed to reside in the thick swampy forests: Falkner affirms that the Patagonians are polytheists. Though Admiral Fitzroy "never witnessed among the Fuegians any act decidedly religious," they certainly do believe in a mysterious being, if the testimony of reliable travelers has any worth. The funeral rites of the Esquimaux clearly indicate belief in the immortality of the soul. It will require more than the testimony of Herne to prove that the North American Indians had no religion. The almost uniform testimony of those most conversant with the facts leaves little room to doubt that, with scarcely an exception, they possessed religious beliefs and engaged in acts of worship.

> "Lo, the poor Indian, whose untutored mind
> Sees God in clouds, or hears Him in the wind;
> His soul proud science never taught to stray
> Far as the solar walk, or milky way;
> Yet simple nature to his hope has given,
> Behind the cloud-topped hill, an humbler heaven."

It may be true, as Lubbock affirms, that "the Australians have no systematized religion, nor any worship or prayer," but, according to his own conception, "most of them believe in evil spirits and all have a great dread of the dark and of witchcraft;" and the burial of implements and arms with the dead is considered as satisfactory testimony to a belief in the continued existence of the soul.

The Figi Islanders possessed a mythology resembling that of Greece and Rome—having gods of peace, of war, of agriculture, of good, of evil, etc. They had temples, pyramidal in form, which were erected on terraced mounds as those of Central America. They also venerated upright stones, as the ancient Druids did. So strong was their faith in a future state, and so potent their conviction that as they left this world so would they continue eternally, that children as an act of religion buried their parents alive ere the infirmities of age should come on—the parents cordially and joyously acquiescing. It was a solemn religious duty, a sacred filial obligation. Children and parents were alike interested in securing departure to a better land while strength and health remained still unimpaired. The custom we may properly regard as horrible to the last degree; but it testifies unmistakably to strong faith in the immortality of the soul, and even to kindliness of disposition, though it is indeed a kindliness begotten of a false philosophy.

We might instance very many other savages,

many of them among the lowest, as the Hottentots and the Bushmen, who undoubtedly possess religious beliefs. Enough evidence has been presented, however, to answer our purpose. Certainly he who takes the pains to examine the facts will be convinced that the vast majority of savages, if not all, have some religious ideas and engage in some acts of worship; though it is true that these are frequently horrid in the extreme.

ELECTRICITY THE MOTOR POWER OF THE SOLAR SYSTEM.—No. XII.

BY B. T. KAVANAUGH, M. D., D. D.

(General Concluding Remarks.)

When this series of articles was commenced, I entertained the hope that at least an *outline* view of all the essential doctrines and principles of the Electric Theory of Astronomy and kindred subjects could be sufficiently compressed into twelve numbers. Notwithstanding the limited space afforded me, and the fact that two numbers have been devoted to side issues, I still feel compelled to bring the series to a close with this number; for I desire that, so far as possible, the subject should be presented in one volume of the MICROCOSM. I console myself, however, in concluding with this number by the reflection that the matter already submitted to the public will stimulate investigation, and will afford to the candid and impartial reader sufficient light on the great cardinal doctrines therein set forth, to enable him to judge of the merits of the theory when properly understood.

I never had the vanity to believe that my theory would be accepted and approved by all the readers of the MICROCOSM, for it comes in immediate conflict with the deep rooted prejudices of education.

To revolutionize the opinions of the enlightened world and the doctrines of the schools, is a work of time and patience which the history of the changes in all past ages demonstrates to be exceedingly difficult. Copernicus after living seventy years and having devoted his active life in laboring to overturn the Ptolemaic theory (which had dominated the public mind for centuries), *i. e.*, that the earth was the centre of the Universe, and that the sun, moon and stars revolved around it, after seeing the first copy of his able work setting forth the present system died in 1543, without having made a single noted convert to his doctrines. Twenty-eight years and seven months after his death his first noted disciple was born, Johann Kepler, who after arriving at mature years espoused the cause of Copernicus. He, with the aid of Galileo of Italy, succeeded in rescuing the work of Copernicus from oblivion, and establishing the science of astronomy upon the basis on which it now stands. Galileo survived Kepler twelve years, and died in 1642. These heroes in the battle for science were not only slow in making converts, but brought upon themselves the severest persecution, the latter forfeiting his liberty and almost his life in vindicating the truth as revealed by Copernicus. Thus, a battle raging for 99 years, was waged against the truth before the lights of science could dispel the prejudices of education.

With these examples before me I must learn the lesson of patience and wait until a generation passes when it is hoped that the republic of letters will be able to resist the powers of great names and long established opinions, and give due weight and authority to *truth*, though it may have been discovered and brought to light by an obscure and unpretending member of the Brotherhood of Man. Hence I am content to place the result of my reflections and investigations upon record, and wait the arbitrament of Time to do justice to my humble labors; yet hundreds have already assented to the truth of the theory.

I have chosen the MICROCOSM as the medium through which to place this record before the scientific public. I decided to do so from the character of its Editor, who, Sampson-like, has slain a host of scientiffc Philistines, and displays his banner as the rallying point of full and fair investigation of all the great subjects that cluster around "the Church, the Ground and Pillar of the Truth." Future generations may reap a harvest of golden treasures of truth from the valiant position taken by the MICROCOSM under its able conductor. Its great multitude of readers are supposed to be, in the main, honest and independent thinkers.

The process by which I have been conducted by slow progressive steps has been prosecuted with an eye to the following great facts: I lay it down as a foundation principle that all *truth* originates with God, and forms not only the basis of every virtue, but is the foundation upon which all true science must rest.

Truth is an essential attribute of the Divine nature. Every truth in the Universe of necessity must be in harmony with every other truth; and hence no two truths in Nature, revelation, or science can be found to antagonize each other.

Upon this basis I have most diligently sought for a knowledge of truth, and wherever found to be positively demonstrated I have embraced it as a treasure, and under the light of each newly-discovered truth have sought to harmonize one with another, and step by step they have brought new discoveries to light, and thus progressively a new system is developed, as in the case of the electric theory, where the whole symmetric outline is compassed and a system more grand and perfect could never have been conceived by the most extravagant exercise of the imagination.

Within this system we find the following principle to be correct: Where the great fundamental pillars of truth clearly and unquestionably stand secure, any intermediate truths not so well established receive great strength and support when it is found that they are in perfect harmony with the great framework of the system. For this reason, though treating chiefly of the solar system, and demonstrating the attracting and repelling forces of electricity to be the agents by which the solar bodies are propelled in their diurnal and annual revolutions, we follow the ultimate action of these vital agents in their influence in the production of vegetable and animal life, the circulation of the blood in animals, and the rise of the fluid in plants, and are thus led to the conclusion that in the most minute parts of the material universe these all-pervading agencies permeate the whole and give life, law and action to every part.

Indeed, we need not stop here; for does not the electric medium bridge the chasm between the physical and the spiritual? When we consider the organism and structure of the delicate nervous system in man, where, if anywhere, a union is formed between mind and matter, it is clear that electricity is the link by which mind transfers the force of action into matter. If this is not correct, we are unable to conceive by what other method such union can be formed. That mind *does* govern matter, is a proposition nowhere denied.

In the light of the principles recited above, it

is clear that God is the source of all truth, both in religion and science. Then there is an inseparable connection between the two; hence, as a Christian minister, I am bound to recognize it as a duty to vindicate God's truth—both in the revelation of His word and of His works.

The study of God in His works is a Christian duty. If, by indifference or indolence, this duty is neglected, the soul is robbed of many rich jewels of truth and knowledge which, if possessed, would adorn and beautify the palaces of the soul where God proposes to dwell. Next to God Himself, MAN in Christ holds the highest rank in the scale of being, of whom we have any knowledge. Whether we test this high rank by testimony of nature or revelation, the decision will sustain this high position. By nature he is recognized as lord of earth. By revelation he is declared to be the son of God and a joint heir with Christ to a throne and dominion in heaven, unto whom the angels become ministering spirits.

To confer honors, dominion and treasures upon man, corresponding to his rank, God created the world expressly for him, and adapted all its parts to subserve his interest, nature and enjoyment.

Could there be a richer field opened to his view than the survey of his dominions and possessions? Should he not measure the force of obligation he owes to himself and his Father God by the high rank given him in the scale of being? If these high considerations do not inspire him to the effort to gain the knowledge and fitness for his high rank, what can inspire or move him in that direction? The danger is that the *greed for selfish gain* will so besot the mind and corrupt the whole soul that his vast heritage will be sold out for the lustful pleasures of a day, and the heirship to this lordly heritage will be forever lost.

Though many high-born heirs to imperishable honors and dominion have been cheated out of their rightful heritage by the sensualities of present pleasures of a low, debasing kind, yet, thank Heaven, all are not thus deceived and blinded, but are inspired by love of truth and all those purer principles which adorn and give vigor to the aspiring mind; and these, though few they be, will turn aside from the follies of their associates and seek that substantial knowledge to be found in the great treasury of nature and nature's God that will endure through the endless cycles of the future. It is to aid and encourage the chosen few that will think and read and get true knowledge that we labor.

Now that this theory is completed as far as it is practicable at present, it is respectfully submitted to the calm and impartial consideration of the intelligent readers of the MICROCOSM. It is not claimed to be perfect in all respects, for doubtless there will be other and great discoveries made which will add to its perfection.

If I have succeeded in nothing more, I shall be content with the reflection that I have brought before my readers a great and comprehensive theory based upon cardinal truths and principles found in Nature, the consideration of which will give pleasing employment to all lovers of truth as revealed in the machinery of the celestial and terrestrial members of the solar system.

So far from shrinking from fair and honorable criticism, we invited it when presented in a friendly mood.

But I object to the practice of asking questions and making objections in a one-sided issue, by which I am made to toil at the laboring oar with nothing to combat in turn. If the objector or critic desires to make a fair issue, let him plant himself on the platform of the theory of universal gravitation on the one side, and I will vindicate the claims of the electric theory on the other. As there are no other theories recognized, this covers the whole ground.

MT. STERLING, KY.

[Next month we will close this Electric Motor-Power argument by printing Dr. Kavanaugh's reply to our last month's criticisms with, possibly, some remarks of our own—EDITOR.]

PROFESSOR LUPTON AS OTHERS SEE HIM.

We have received many letters from Southern Methodist Ministers commenting severely upon Professor Lupton's card, which we copied last month from the *Nashville Christian Advocate*. (See June No. page 348.) The following sentences are taken from the letter of the Rev. Jas. J. Billingsly, of New Orleans, and express the views of hundreds of Prof. Lupton's brethren, who read both the *Advocate* and MICROCOSM.

"I dislike to dissent from one so prominent in our church as Prof. Lupton, but will do so when truth demands it as in this case. Could not Prof. Lupton have seen that it takes time to start such a new departure in old and staid colleges? and that it was not to be expected that the substantial theory of sound could be introduced, at least until there was a text-book from which to teach it? Your work has but just commenced, and your onslaught has but just been made against the wave-theory; and is it not "absurd" to suppose that colleges should this soon be teaching your theory, even if it were invincibly correct? Let Prof. Lupton wait a bit, and he will probably see what this "absurd" thing will amount to. In the mean time why does he not show up the absurdity of the substantial theory himself, instead of issuing his denunciatory cards? Echo answers, "Why?" Truly, Mr Editor, I am sick at such petty insinuations and charges by scientists who dare not attempt a refutation of your theories in a fair and open field. For a man to go spluttering out words of contempt and semi-abuse against a theory which has commanded the respect and attention that yours has, and without offering an argument against it, is simply disgusting. It is scientific inconsistency if not downright dishonesty, and shows defeat without the candor to admit it. Men that will hold on to a fairly exploded theory evince scientific depravity. Their condemnatory cards are but wails of despair. If the scientists of this day expect the fundamental doctrines of the *Problem of Human Life* to be put down by laughter and ridicule, the 50,000 readers of that book will tell them they are mistaken. Before the readers of THE MICROCOSM will join in the laugh they will be apt to want to be shown where the laugh comes in. No thinking man will stop thinking at the beck of any scientific professor, unless he presents something better than ridicule. The man who at this date tries to meet Wilford Hall's arguments by ridicule only makes himself ridiculous. If you can't meet his arguments against the wave-theory, then gentlemen, the best thing you can do is to keep silent. Do you understand? JAS. J. BILLINGSLY."

But here is one on the other side, from the pen of the Rev. Dr. J. H. Riggin, Presiding Elder in

the M. E. Church South, at Pine Bluff, Ark., one of the Professor's brethren who agrees with him fully. It is only fair to give both sides:

"DR. HALL, Dear Sir:

"I send you a clipping from the *Nashville Christian Advocate* from the pen of Prof. Lupton. Now you see where you are. There is clearly nothing left for you but to subside, and try to atone to the multitudes of your deluded followers for the "absurd" views you have been putting forth. You here see how easy it is for your arguments to be met and smashed when they are assailed by a "respectable" scientist. Prof. Lupton is a man of few words. He is also a man of "repute," and one who stands high in a "respectable institution." How can any "absurd" man like you expect to stand up against such weight of respectability and overwhelming logic? You have withstood the onslaughts of many a foeman, and have come off with flying colors. But they were not *Luptons*. You might succeed in answering most critics, but you must give in to this professor of Vanderbilt University. His arguments carry everything before them like one of our modern tornadoes.

I confess I was led to think at one time that you had destroyed the wave-theory of sound. Your arguments were so provokingly clear, I felt assured that no man could answer them. What a fool was I? Yes, what an ass! I had never thought about your want of respectability, and that you were an "author" of no "repute," and that no other "than the wave-theory is taught in any *respectable* institution." That settles the matter, and of course proves your views "absurd." Hence, the wave-theory is demonstrated to be correct after all your efforts to the contrary. Now, I believe, since Prof. *Lupton's* decision, that a *locust* can rasp its little legs across its wings and shake four cubic miles of air into "condensations and rarefactions," with mechanical force sufficient to change the temperature of the whole mass from hot to cold and *vice versa*, 440 times in a second, and by which means it can add 174 feet a second to the velocity of its own sound. Of course I must believe this if I wish to be "respectable," since Laplace and Tyndall, both men of "repute," have shown it to be scientific, and since every "respectable institution" teaches it. I further believe that this insect by the strength of its vibratory organism compresses and shakes each quarter inch of the four cubic miles of air with sufficient force to bend in and out a tympanic membrane, if one were present, as we can only hear sound by such tympanic vibration; and it is "absurd" to say that we hear any other way. Hence, as there is room enough in the four cubic miles for 2,000,000,000 tons of such solid matter, as you show in your "absurd" book, and plenty of space left to vibrate, I believe that the insect exerts that much force 440 times a second and frequently keeps up this amount of energy for a full minute at a time. Of course, I believe this, as I claim to be "respectable;" and I never intend to be anything else. I never was "absurd" in my life, only for a short time—when I supposed you had overthrown the above-named achievement of the locust. But I have now taken it all back, and have again become "respectable." Yes, I not only believe this locust business, but I believe still more, that the whole stellar space from here to the pleiades, is full of *jelly*, which all scientists of "repute" call *ether* which has the properties of a *"solid,"* including *"inertia,"* and that 699,000,000,000,000 waves of this *jelly* strike the retina of my eye every second without my feeling it! Of course I believe all this because Prof. Lupton does, and because it is taught as science in every "respectable institution." And, moreover, how could we see at all, if this *jelly* did not fill all space and dash into our eyes at the above-named rate? It would be manifestly "absurd" to suppose we could see without *jelly*, if every "respectable institution" teaches it. I believe many other things about sound and light too tedious to mention, but as simple and self-evident as those already named. For example:

I believe that two unison organ pipes of the largest size, say low E, placed half a wave-length apart, that is 14 feet, and sounded at full blast, would silence each other by the "rarefactions" of one pipe coalescing with the "condensations" of the other. Of course, I believe it. How could I do otherwise when it is according to the law of sound-interference, as taught in the wave-theory, and when no scientist of "repute" doubts it, and when every "respectable institution," including Vanderbilt, teaches it, and last but not least, when Prof. Lupton says your views are "absurd" in that you doubt this self-evident law? Common sense ought to have told you better than to oppose such a simple and beautiful law just because you don't understand it! True, you call upon professors and colleges to try the experiment of sounding any two unison instruments in this way to see if the law is correct; and you even offer $5,000 to any one who will produce silence in that way, and thus prove the law true. What nonsense! Don't you know that it would be "absurd" for a college professor to get $5,000 that easy? And then can't you see that it would be disreputable for any "respectable institution" to encourage an experiment which would call in question the truth of a theory that all the colleges teach? How "absurd" you must be to suppose such a thing! And how foolish you are not to see that a tuning-fork's prong *"swiftly" advances*, even if it does not travel at the rate of *one inch* in a second, as you show. You assume to know what "swiftly" means when used by an "author of repute" like Prof. Tyndall. How "absurd"! Then what presumption to try to pick to pieces his experiment of the "tin tube," and not to see that it is the sound alone which "blows the candle out?" Even if the entire tube were to be filled with the smoke of brown paper, as you suggest, and if it would then emit a visible puff every time the books were clapped together, as you show and as we know it would, what of it? Do you suppose a candid and well-posted scientist, and a man of "repute" was going to spoil a philosophical experiment before a "respectable institution" by such an "absurd" way of performing it? How strange to suppose he could thus thoughtlessly overturn a theory taught in all the colleges, when by scientifically putting the smoke in the end of the tube fifteen feet away from the outlet there could be no possible danger of spoiling his lecture by driving out a puff of smoke before his audience! And yet you virtually charge him with ignorance in not knowing that it would take a dozen or more claps of the books to drive the smoke that far. I am surprised at your presumption! Prof. Tyndall was no such fool. Then you say you have filled a paper bag with this *sound* or whatever it was that "blows the candle out." Suppose you have; what of it? Would you dare to doubt that "the *pulse* has passed through *both smoke and air without carrying either of them along with it*," when every "respectable institution" teaches it? Of course a "mode of motion" will fill a paper bag. What are you thinking about?

Now why don't you get a Vanderbilt or some other rich man to start a college to teach your "absurd" views and thus make them "respectable"? Money will do almost anything.

But there is one thing that puzzles me, and I would like to ask Prof. Lupton about it; but I am afraid of him, lest he might think me "absurd." When Dr. Harvey first proclaimed the circulation of the blood, no "respectable institution" or "author of repute" taught it; but they all unanimously condemned it as "absurd." Now what I want to know is this: Was it then false, because it was "absurd"? and has it now become true, because all "respectable institutions" teach it? Again: Bro. Jasper's theory that "the sun do move," was once taught by every "respectable institution." Did that make it true? and did Galileo teach falsehood because he taught the then "absurd" doctrine of Copernicus? Was the Ptolemaic system of astronomy then true because it was "respectable," though false now? And was the Copernican system then false because it was taught by "no author of repute"? and is it true now because it happens not to be "absurd"? Suppose that in the twentieth century the wave-theory of sound should be held to be "absurd" by every "respectable institution," would that make it false then though true now? And should every "author of repute" then teach the substantial theory, would the present "absurd" and false theory *of substantialism* then become true by becoming "respectable"? *Well, all this is just what is going to happen*, or, I should have said, just what would have happened had not Prof. Lupton issued his card. Of course it cannot happen now. So there's no use of your calling a Convention at Chautauqua Lake. It will do no good. The jig is up. You may get a few of your disreputable admirers and "authors" of no "repute" to convene and pass "absurd" resolutions, but it will amount to nothing, as neither Lupton nor myself will attend. We are both "respectable" and believe in the wave-theory.

Yours Respectably,

J. H. RIGGIN.

THE METRIC SYSTEM.

BY PROF. EDWIN R. GRAHAM, A. M.

We have just read the article of Prof. Melville Dozier in the March number of the MICROCOSM, entitled, "The Beauties of the Metric System." The Professor calls it the "very perfection of beauty and simplicity," and thinks those who object to its adoption "little short of lunatics!" We shall not employ so strong language toward those who may differ from us; and, while we do not propose to pen a criticism of Prof. Dozier's article, we may be pardoned if we record the opinion that the much-lauded system is far from "perfection" in any sense—most of all in "beauty."

The advantages which Prof. Dozier claims, in common with the friends of the system, are, (1) An accurate and unchangeable unit. (2) Harmony with foreign governments. (3) Facility of reduction.

In regard to these assumed advantages, we remark that the unit of the French system is supposed to be the one ten-millionth part of the quadrant on the meridian of Paris. But this is only a supposition, since the quadrant has not been measured and cannot be. Doubtless a part was measured, and the whole *computed*, but here is an element of uncertainty. The standard meter is a bar of platinum kept among the archives in Paris. Duplicates of this bar have been furnished to the United States. Greenleaf says the meter was "*intended* to be"—"is *nearly*"—one ten-millionth of the quadrant. Prof. Peck, of Columbia College, says it "*approximates* it," is "*nearly* equal to 39.37 inches." Notwithstanding the famous survey between Dunkirk and Barcelona, we are compelled to depend upon a bar of platinum and its duplicates for a standard. The unit of our present system is the Imperial yard of Great Britain. The standard was obtained from England in 1856. It is of bronze, and of due length at 59.8 degrees Fahrenheit. This standard was obtained from the length of a pendulum beating seconds at London, in vacuum at the level of the sea. Divided into 391,393 equal parts, 360,000 of these parts were taken to be a yard, the pendulum being 39.1393 inches long. Here then is a unit with less of uncertainty than the meter. It is not founded, as charged, upon "caprice or accident," nor is it a "relic of barbarism." It is "purely scientific and perfectly simple in its origin and nature," satisfying the requirements of accuracy and unchangeableness. Thus far the English unit has the advantage over the French.

The second advantage claimed might be passed over as more sentimental than real. We are separated from Europe by the broad Atlantic, and from Asia by the broader Pacific. Independent in our resources, and bound by no entangling alliances, the customs of those distant nations can be a matter of but small importance to most of our people. If this system is necessary for commercial purposes, it is strange that the countries which have adopted it have not applied it to *money*—the most important commodity, since it is a measure of value. We have little or nothing in common with the old world, and might as reasonably be asked to adopt their language, manners and customs as their measures.

The third advantage claimed—easy reduction—we grant without argument. We might notice a serious defect in regard to nomenclature, but space forbids. Allowing the system the full benefit of *all* the advantages claimed by its friends, there are many weighty objections to its adoption. Among these we shall urge (1) that its adoption would only add another table to those which we already have. The difficulty and complexity of our denominate numbers would be increased accordingly. We need not dwell on this point, since Prof. Dozier admits its truth in his article. Since it enables us to do nothing more or better than we can do by the English method, its *superabundant uselessness* is sufficient reason for its rejection.

We observe (2) that it is a *partial* system and must forever fail of universal application. A year consists of about 365¼ days, or nearly 13 months of 4 weeks each, each week having 7 days. However inconvenient these numbers, neither the ingenuity of the scientist nor legal enactments can modify them. They will remain unchanged while the present order of the universe exists. Therefore we cannot apply the metric system to measurements of time, latitude or longitude. It cannot be applied to the circle, nor to trigonometry plane or spherical. This demolishes the claim to universality of application. What more is necessary to demonstrate the absurdity of establishing an arbitrary unit for *all* measures in connection with an inflexible ratio of variation? Its inconsistency we shall hereafter notice, and we shall show that it fails in all the particulars of simplicity, uniformity and symmetry.

We charge (3) that it is in the highest degree

inconvenient. This fatal defect is founded on the very property on which its claim to general favor is based—the reduction of each measure or weight to a single unit and its *decimal* multiples. We shall examine the tables in their regular order. The meter will be assumed equal to 39.371 inches. (What the length of a meter is, we presume no one knows. Of half a dozen works on the subject in the writer's possession, no two agree.) One mile is equal to 1609.30634x meters. Five miles are equal to 8046.5370x meters. Twenty-two miles are equal to 35404.73948. What an array of figures to represent 22 miles! Should it be suggested that we ought to reduce to higher denominations, we comply. 22 miles are equal to 3 myriameters, 5 kilometers, 4 hectometers, 4 meters plus, 7 decimeters, 3 centimeters, 9 millimeters, and 48 hundredths of a miilimeter! If the mind is confused by such a jargon of words and figures, it will retire baffled and bewildered from the contemplation of hundreds and thousands of miles expressed in meters. Assume the distance to the sun to be 93 millions of miles. It is true we can have but a vague idea of that enormous distance, but compare the simple expression, 93 millions, with its equivalent in meters—149,665,489,620? Where is the fault? Manifestly in the unit. It is too small for great distances, and too large for small ones. In this respect our present system is superior. We use various units for various purposes, from one-twelfth of an inch to the diameter of the earth's orbit.

We shall now give our attention to the table of surface measures. In the introduction of two units into the table of areas, we have an example of *inconsistency.* The square meter was found to be too small a unit, and the square dekameter was introduced, and called the *are.* This unit is not applicable to the measurement of farms in this country. Reduce 899 acres to ares, and we have 36382.53 ares, equal to 363 hektares, 8 dekares, 2 ares, 5 deciares and 3 centares. A sheet of paper 7 inches by 5, covers an area of 35 square inches. Reduce to meters and we have 22582 one hundred thousandths of a square meter, or 2 square decimeters plus, 25.82 square centimeters. Would the unbiased reader not prefer 35 square inches?

Let us turn our attention to measures of volume. We shall measure the contents of a brick. Suppose its dimensions are 2 inches, 4 inches and 8 inches, then its cubic contents equal 64 inches. Now 64 cubic inches is reduced to meters by dividing 64 by $(39.371)^3$. The result is 10,487 ten millionths of a cubic meter. Here we observe the unit is too large to express conveniently the smaller cubic contents. We might read it 1 cubic decimeter plus 48.7 cubic centimeters, but there is not much improvement. When we compare these labored expressions with 64 *square inches*, the "perfection of beauty and simplicity" seems to be on the side of our English method.

In the table of capacity the unit is the *liter*, equal to 1.0567 quarts, U. S. wine measure. The first idea that naturally presents itself is, that a quart is an inconvenient unit for expressing fluid drams and fluid ounces, nor is it better when we wish to express the contents of barrels and cisterns. A cistern holds 29 hogsheads. How many liters does it contain. Ans. 6,915,195 liters, or 6 kiloliters, 9 hektoliters, 1 dekaliter, 5 liters, 1 deciliter, 9 centiliters, and 5 milliliters. 27 hogsheads may not be a very *elegant* expression, but it is infinitely preferable to such gibberish as the above.

The inventors of the system were themselves sensible of its defects, and as a partial remedy violated their plan of uniformity by the introduction of new units. This has been shown in the table of areas. But in the table of weights, we find the *quintal* and *tonneau.* These have no relation to the gram—no nominal nor apparent connection, and yet the gram is the unit for the weight of "all substances." A load of hay weighs 2,576 pounds, equal to 1,168,481.07 grams, or 1,168,48107 kilograms, or 1,168 kilograms, 4 hectograms, 8 dekagrams, 1 gram and 7 centigrams. How beautiful! How would the weight of a locomotive look if expressed in grams? or that of a ship and cargo expressed in either grams or kilograms?

We have now examined in detail the tables of length, area, solidity, capacity, and weight; and find in every instance that a fixed unit and its decimal multiples result in a series of *awkward in consistent* and *inconvenient* tables. Of this our illustrations are conclusive. The difficulty, however is not so much in the unit as in the inflexible ratio of variation. A ratio of ten is too large in some cases, and too small in others.

The inconvenience and impracticability of this system have been abundantly demonstrated. Its adoption, to the exclusion of our present system, would necessitate the rewriting and reprinting of mathematical works. This consideration alone is a weighty objection. It is not well adapted to the wants of common people, because it requires too many long words and too many figures. Our English system is not so difficult, complicated and cumbersome as is usually represented, and is much more convenient than the system under examination.

To conclude, Prof. Dozier thinks the only way to render its use universal in our country is by legal enactment, and that it is "a standing reproach to our law-makers" that "it was not done long ago." This method of making the Meteric System popular is, indeed, the only one that promises success; but it is a method better adapted to the monarchical institutions of Europe than to the republican institutions of America. For seventy-five years the French government has been trying to compel the use of this system, and it has not yet quite succeeded. If seventy-five years have been consumed in forcing this odious system on the French people, there is a reasonable hope that in this more free and enlightened country, we may long be spared the infliction and the affliction of the Metric System.

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☞If any contributor or subscriber knows of intelligent friends at a distance who, he thinks, would be benefitted by reading THE MICROCOSM, and will send us their names and address, we will cheerfully send this number of the magazine for the good of the cause. But this only relates to the present (July) number of which we print extra copies. No free copies of next volume can be sent. We have already put the entire profits of the journal into free copies, as well as the profits of all our books. Some of our disinterested friends kindly suggest that it is about time that the Editor was laying by something for future contingencies. Possibly this may be so, though we had not yet thought of it. One thing, however, is true; we have not yet kept back from the spread of our work *one single dollar.* It has all gone into it.

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A. WILFORD HALL, Ph.D., Editor and Prop'r.

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SPECIAL NOTICE.

In our conduct of this journal we desire to give our list of excellent contributors the widest possible latitude for the conveyance of their honest convictions, so long, at least, as this liberty does not conflict with the general aim and scope of THE MICROCOSM. But we wish our readers definitely to understand that we do not hold ourself responsible for the views of our contributors, nor, in fact, even for our own views, as we are liable at any time to change ground on receiving more light, as we have done more than once since this paper was commenced. But, generally, we hope and aim to be consistent. EDITOR.

CYCLONES—TORNADOES.

THEIR CAUSE AND REMEDY.

The wit who described a tornado as "an escaped earthquake gone mad," was, no doubt, mistaken, though they sufficiently resemble each other in destructive qualities to have descended from the same progenitor. The tornado—frequently called cyclone—has all the terrific effects of an earthquake, and many to which the earthquake is a stranger. The latter, if severe, wrecks your home, but leaves its substance upon the ground where it was originally located, and which you can again reconstruct after the catastrophy is passed, unless you are so unfortunate as to have been buried in its ruins; while the tornado not only wrecks your dwelling but carries the fragments away bodily with other things of value—such as fences, outhouses, stock, feed, &c., which an earthquake does not meddle with. Hence, the tornado is the most dangerous and the most terribly to be feared of all man's natural enemies.

Like an earthquake, the devastating tornado cannot be foreshadowed, or at any event cannot be anticipated but for a very brief period before its fury is upon us.

It is distinguished from the cyclone proper by its local character, and by its habit of traveling in a straight and narrow path, or at most varying but little from a straight path by trifling zigzag breaks; while the *cyclone*, as the name implies, is a circling storm of wind and rain, or snow, of vaster extent and duration, and not so destructive in any one locality.

The tornado is usually preceded for several minutes by a portentous and almost oppressive stillness, as if the aerial forces were holding their breath and husbanding their strength for a desperate effort at destruction. This to some degree may be taken as a warning that might be judiciously heeded in hurrying for safety in sections of the country where such meteoric phenomena are common, though such foreboding stillness often occurs when no tornado follows, the tempest betokened dissipating itself in the upper regions. Although this stillness precedes for many minutes the tornado itself, yet there is anything but stillness or quiet when it is breaking. The roar of a hundred express trains and as many cataracts would not equal the terrific uproar that heralds its immediate approach, especially when forest trees are being crushed in its path.

A few minutes before the tornado proper has assumed shape, angry-looking clouds may be seen approaching each other at a point overhead or nearly so. These clouds indicate the wind-currents which are driving them and which have been started as the result of the irregular heating of the earth's surface and the higher atmosphere by the sun's rays, as the direct cause of the tornado. This

irregular heating of the earth is chiefly caused by the shadows of an area of dense clouds cutting off the sun's rays from a section extending possibly over many square miles of the earth's surface. This cooling process produces a sudden shrinkage of the atmosphere beneath the cloud with a corresponding increase of its weight, thus causing it to rush downward from the expanse of vapor, while above this cloud the air is heated by the reflection of the sun's rays from the cloudy surface, thus expanding it and making it lighter. This forces the air upward from such expanse of cloud, and in this manner the aqueous vapor constituting the cloud is left in a partial vacuum by the air, leaving it in both directions. The result is the vapor congeals by this rarefaction into partly frozen drops of rain which now begin to descend by their augmented weight, and to which other drops or particles of congealed vapor attach themselves, thus generating the hail-stones of varying size, which almost uniformly accompany tornadoes.

But while the process here described is taking place in the cloud area, other cloud areas distant in different directions are preparing similar meteoric effects which may be called the skirmishing forces of the tornado preparing to break upon the earth, but which would probably be powerless to culminate but for the fact that within or between these cloud areas there is a vast region of clear sky through which the sun's rays reach the earth uninterruptedly, heating and expanding the air near to the ground and causing it to rise with great velocity, thus producing a vacuum tendency above such area of earth. This sucks the cold air from beneath and above the various cloud expanses, and by these currents the clouds themselves are drawn toward a focal centre, producing the angry appearance first alluded to. The result is a collision of air-currents, striking each other at various angles, and the combined effect of which is the forcing downward of a mighty torrent of compressed air, which may strike the earth perpendicularly or at any angle according to the angle at which the various currents chance to collide. But always this combined current, which constitutes the real tornado-blast, necessarily reaches the earth in the form of an inverted cone by its very mode of formation, with its base at the place of the cloud-collision, and its apex or a part of the cone near the apax at the earth's surface. This conical or wedge shape is therefore the natural result of the collision by which the condensed blast is generated and hurled diagonally downward, as any one will see by a little reflection.

What share electricity plays in the upper air in starting its currents, causing vacuums, etc., is still a mooted question. That it collects in the clouds in vast quantities is shown by the lightning flashes sent forth. It is also a matter of speculation as to the relation, if any, existing between sun spots and the recurrence of these tornadoes. We have been inclined to favor the view that some such relation exists from their frequently observed concurrence; but to what extent they are related may be still considered as a matter of conjecture only.

In accordance with the theory just explained, as to the true and immediate cause of tornadoes, they naturally must occur in the afternoon or toward evening, when the sun's effect on both earth and clouds has had full time to culminate. Very seldom has a tornado occurred after night-fall, and then only when by peculiar combinations of currents, produced in the manner described, they were prevented by counteracting clouds from completing the culmination earlier in the evening.

It is also a fact of observation, which agrees perfectly with this theory, that if the apex of this inverted cone touches the earth at its exact point or tip, its destructive effect will be great, just in proportion as its path is narrow. Plainly this results from the greater concentration of the atmospheric pressure at the tip of the wedge, making its force greater the narrower its path of sweep. If the cone, on the other hand, is formed by the collision of currents taking place nearer to the ground, it is plain that the tornado will sweep the earth with a cross section of its cone nearer to its base or upper end, or farther from its point, thus sweeping a wider swath of territory, and consequently weakening its force in like proportion. But if the lower point of the cone barely touches the earth it would easily happen, by the action of the currents, that it might be moved up and down and thus be lifted entirely clear of the ground for a certain distance, and again let down to touch the earth with its destructive apex. Accordingly, we observe that many of the most destructive tornadoes that travel through a region of country only touch the earth in spots.

It sometimes happens, however, that a compound collision of many air-currents occurs in such relation to each other as to produce *twin* tornadoes, or a pair of cones which drive along the earth side by side like furious run-away steeds. Such a remarkable pair of phenomena recently occurred in the State of Indiana, leaving about a mile of undisturbed territory between their two cone-paths of devastation.

It is thus not alone the great velocity of air-current which produces the astonishing effect of removing massive structures, even in some instances leveling stone buildings to the ground, but it is the intense pressure or compression of the air, combined with the high velocity, in consequence of the concentration produced by the collision of counter currents, as just described, which causes the chief destruction. It is doubtful if a single atmospheric pressure of fifteen pounds to the

square inch, even with the highest recorded velocity of a tornado, would begin to remove any well-constructed dwelling. But with the air concentrated to two and possibly three atmospheres, as is no doubt the case at the very apex of a violent tornadic cone, it must approach in some degree to the density and violence of a rushing torrent of water. In the caissons of the Brooklyn Bridge, when the sub-aqueous excavations were making, there was less than two atmospheres concentrated in the working chamber, and yet the pressure was such as to prevent the workmen from whistling audibly, and the effect of the air-pressure on the lungs of those who have been caught in a severe tornado is described as the same as that experienced in a caisson, only more deathly.

We have thus tried intelligibly to explain the cause of the tornado, and the nature as well as cause of its destructive effects over ordinary wind storms. We see from our analysis, however, that there is very little chance to exercise precaution in guarding against such dangers. Even when the heralding avalanches of clouds are seen to be rushing together, we know not what direction the wedge-shaped cone-blast will take, caused as it will be by the angle of the chance meeting of the two or more storm-fiends that are madly plunging at each other a few hundred yards above our heads. Hence this accidental course of the combination-avalanche of air, when it descends and reaches the ground, cannot be predicted by the most acute meteorological observer; and, consequently, no possible amount of scientific knowledge will insure the safety of the beholder of such momentary signal of the tornado's approach. The greatest chance of safety is always in fleeing to a cellar if such retreat should be accessible, and remaining as nearly as possible at the side of the cellar wall next to the approaching blast, to avoid the flying debris, should the building be carried away.

So necessary is some such subterranean retreat becoming, by the appalling loss of life recently experienced, that we learn of many farmers and village residents, in the tornado-infested regions of the West, constructing suitable excavations in their yards, and of easy access, called "tornado retreats," to which the family can rush for safety at the first signal of such approaching danger. No doubt this precaution will in time become general, especially throughout the level country of the South and West, where the most destructive tornadoes are apt to prevail.

This terrific effect of atmospheric concentration and sweep which result in tornadoes, is almost indigenous to prairies or level, treeless tracts; very few destructive tornadoes having been known to occur in hilly or wooded regions of the country. The reason for this appears to be that such collisions of counter-currents in the upper air, which, no doubt, occur more or less frequently in all sections of the world, are broken up and dispersed, or at least greatly weakened, by contact with the uneven surface of the earth, and especially with forests, even after they have formed, and are thus prevented from culmination in that peculiar inverted cone, whose lower apex mows its fiendish swath of destruction as it moves along the ground. But in most cases, the very cause of tornadoes is averted by such forests and hilly regions. Occasionally, however, one of these triangular or quadrangular tornado-cones chances to form in the upper air over a hilly or even timbered country, and throws down its inverted apex upon such a surface-formation as exactly favors its sweep. The result is that a destructive tornado will be experienced, as was some years ago recorded in the State of Connecticut, and two years ago in Pennsylvania, in which latter instance even a stone building was torn to pieces. Still, such occurrences are very rare, for the reasons given; and for the same reasons we have reports of many of these visitations every season in the level sections of the South and West, many of them attended with fearful destruction of life and property.

So common are tornadoes in the great prairies and plains of the West that not one, perhaps, in a hundred that sweep the barren wastes is reported at all, many of which, had villages been in their paths, would have brought total destruction to most of their inhabitants. The marks and paths of such tornadoes that have expended and wasted their fury on the habitationless waste, have been often seen and traced for miles by the early prairie pioneers. They have found the uptorn grass and sedge-bush, and even dislodged portions of the soil itself, as witnesses of such devastation.

Well do we remember one of those terrific storms which came upon our train in the spring of 1860, as we were camped about 200 miles east of where Denver City now stands. It was about seven o'clock in the evening. The lurid heavens, and the still noise in the distance, with the madly whirling and rushing clouds, betokened the vengeful wrath of the storm-king, and thus the elements gave us a few moments only of warning. We called for Holloway and Sumner instantly to lower the tents, which had just been pitched, and prepare for the worst by lashing all loose luggage to the heavily-loaded wagons; but before it could be completed the tempest struck our encampment, snapping cordage and tent-poles and overturning and wrecking two of the lighter wagons. We saved ourselves by holding securely to the wheels of the heavy wagons which were fortunately held down by 50-cwt. each, and were thus kept from being blown away till the worst of the blast had subsided. Our oxen and mules, pow-

erless to resist its force, were carried before the current, and were found by the drivers the next day scattered ten miles to the south-east of our camp.

But here we had a lesson in practical meteorology. By a little examination we found that we had fortunately escaped the inverted apex of that terrible cone of compressed air. About four or five hundred feet south-west of our camp the point of the wedge had passed and the very grass had been shorn from the soil, and in places the surface of the ground was torn loose and carried away. Had this central plowshare of the aerial engine ripped through our little camp direct, we fear this hair-breath escape would not now appear in the MICROCOSM, nor the MICROCOSM itself be read. Yet tornadoes of equal violence are, no doubt, common all over the uninhabited plains of the West.

To entirely prevent or guard against cyclones and tornadoes is, of course, impossible. To mitigate them and thus lesson their frequency and destructive effects we believe to be feasible, though it is a work of time and concert of action or coöperation on the part of large sections of country. Nay, whole States should take action, if not the entire nation, and encourage by legislation and all possible means, the planting and cultivation of the hardiest species of forest timber; especially those trees which soonest take the deepest roots.

Not only would such concerted action on a general scale check or at least mitigate tornadoes, but, as is well-known to those who have given attention to the science of forestry, would instigate those meteoric conditions of the atmosphere which draw moisture to regions of air that would otherwise remain dry and to lands that would remain barren and parched. In this way, as proved in the older countries of Europe, distant evaporation would be encouraged, moisture would be distributed, rain areas would be equalized, and what is better for the health of man and animals, the air would be kept vitalized with oxygen exhaled from every green leaf in return for the deleterious carbonic acid gas exhaled from animal lungs and pores, but upon which vegetation of all kinds luxuriantly subsists. Forests not only coax by natural laws the moisture from distant seas, lakes and oceans, to be condensed into rain and snows, but they prevent by their color and shading effects, the intense reflection of the sun's rays which breed the very air-currents which culminate in the deadly tornado and cyclone, as we have endeavored imperfectly to explain. General forests would, also, as reason and experience must convince us, protect the snow-fall of the winter season, thus preventing its sudden or simultaneous melting during a heated spring term, and in this manner would prevent the destructive freshets and floods along our river-courses, now becoming more common and devastating every year, alone on account of the rapid denudation of our forest regions of their timber.

In conclusion, we believe that the real statesman and far-seeing political economist can do no better work for his day and generation and for future generations than to use his statesmanship and science in devising schemes and setting on foot legislation for retimbering the treeless regions of our common country as here suggested. Let him remember that he who proudly helps to decorate and ornament our magnificent domain, by covering every available spot with the green robes of forest trees, will prove himself the benefactor of his race by thus equally enhancing the permanent wealth and enduring prosperity of the nation.

PROF. COMSTOCK ON SOUND.

SOMETHING NEW IN PHILOSOPHY.

As intimated in the April MICROCOSM, page 286, Prof. Comstock, of Knox College, Ill., has at last ventured to criticise our position on sound, as originally put forth in the *Problem of Human Life*. Yes, he really takes the personal risk, notwithstanding our friendly warning that he should keep clear of danger. He does this also notwithstanding the recent experience of his disastrous failure on the gravitation discussion in which he thought to agree with Newton and the current view, though contradicting every authority on the subject, as well as common sense, by denying the self-evident reactive pull of attracting bodies. He has evidently studied this matter of sound seriously for some time before venturing out into his threatened article, but thinking, no doubt, that even the risk of failure would be preferable to silence, after our advice, he gives another column and a half in the Galesburg (Ill.) *Republican-Register*, and determines to take the consequences.

Nearly every point, however, that he attempts to make against our positions has already been met and explained in the MICROCOSM, some of them more than once, as all its intelligent readers know, and as Prof. Comstock ought to have known, since he is a subscriber for this magazine. Take, for example, the question of *sound-decrease as the square of the distance*, which was forever settled as a scientific fallacy by Capt. Carter in the series of careful experiments carried out on the parade ground of the Pennsylvania Military Academy at Chester, as reported with all their details in the November MICROCOSM, First Volume. No man has pretended to question the accuracy of those experiments, or to deny the disastrous result they gave to the wave-theory. Suppose, therefore, that in stating our objections to this fundamental law in the "*Problem*," we did err in some of the details of our figures, as Prof. Comstock charges, what does that amount to so long as the law itself breaks down, by our assault, the first time it was ever called in question? That it has broken down, we again refer to Capt. Carter's experiments made at our suggestion.

Next, take the well-known problem of the jarring of windows by thunder-peals, which no one pretends to question, as so fully explained in the "*Problem*," and reiterated last month in answer to Mr. Cowgill's letter (page 324). In those explanations it was shown that it is only by *sympathetic vibration*, and not by an air-wave, that a tensioned

pane of glass can jar in consequence of thunder, and that a sound not in such sympathetic unison with the tensioned body could not stir it, much less break it, *though a thousand times louder than the tone which caused it to rattle!* Yet, Prof. Comstock goes right on, totally ignoring this explanation, as if he had never seen it, and repeats over the stale and superficial observation of the jarring of windows by thunder and other deep tones, as positive proof that the *sound* of the magazine explosion was really what broke the windows at Erith, as Prof. Tyndall teaches, and hence that it was the *sound* only, which, nearer to the magazine, leveled buildings to the ground and disintegrated men and animals. It seems impossible to believe that such stupendous misapprehensions of the physical laws, lying right on the very surface of science, could bear sway in all our colleges and keep the minds of physical professors so totally blinded, even after the matter has been repeatedly explained to them. Yet it is an astounding historical fact. To show how inexcusably Prof. Comstock ignores these explanations and their fatal consequences to the wave theory; how completely he disregards the simplest elements of physical science in not even mentioning the enormous amount of powder-gas generated and instantaneously added to the air at an explosion, which we have demonstrated to be the sole cause of breaking windows; and how studiously and consummately he conceals from his readers the fact that not a cubic inch of gas is added to the air by the much louder sound of thunder, and hence that no condensed air-wave is sent off, we here quote his tacit indorsement of the current theory upon that subject:—

"During the evening of December 21, 1876, a detonating meteor passed south of Galesburg at a distance of some sixty miles. In about five minutes after the passage of the meteor a very heavy sound was heard, and at the same instant a window beside where I sat was violently shaken. [Of course the sound did it by *sympathetic vibration*, the window happening to be tensioned in *unison* with the tone from the meteor.—Ed.] There was no perceptible fraction of a second between the sound and the rattle of the window. No 'puff of air lagging behind the sound' caused the motion. Similar phenomena may be observed frequently during thunder storms. Indeed, half a dozen times within a month I have noticed the sound of thunder and the rattle of the windows caused by it to occur at the same instant. And so the phenomena of explosions furnish no conclusive argument against the wave-theory of sound."

"*No conclusive argument against the wave-theory of sound?*" He almost gives it up, and if he had done simple justice to his conscience he would no doubt have given it up entirely, and frankly told his readers that the "argument against the wave-theory of sound," drawn from magazine explosions, was absolutely "*conclusive.*" He would have told them that for the first time in any publication, the *Problem of Human Life* had explained to the scientific world the true cause of the breaking of windows at a distance from an explosion of powder, namely, the sudden generation of a vast quantity of gas by which a densely compressed air-wave is forced off, and that the accompanying sound-pulse has nothing to do with it and plays no part whatever in the destructive effects, because the current view, that sound is constituted of air-waves, is a fallacy, and an imposition upon the scientific world.

The truth is, Prof. Comstock does not candidly read the arguments he pretends to review, or else he is incapable of close philosophical reasoning or critical scientific discrimination. We incline seriously to the latter view, and will now give such cogent reasons for so inclining that we think every intelligent reader of this paper will agree with us.

Take the following choice example: In his late article he first states correctly our position, in which we urge that a tuning-fork's prong, by its very slow motion, cannot possibly send off air waves at the rate of 1120 feet in a second, the velocity at which its sound is known to travel. Prof. Comstock controverts this, and to prove that we are mistaken, and that the rate at which air-waves will travel bears no sort of relation to the velocity of the disturbing body, he refers to the well-known phenomena of water-waves, and to the fact that the slow or fast motion of a body which disturbs the surface of still water does not affect the velocity at which the waves travel when once started. Then as an additional illustration, he refers to the well-known fact that a ball struck by a bat, receives a much greater velocity than that of the bat which sends it! Now, this most superficial reasoning, which we have been anxiously expecting for years, is just about what might be looked for from such a professor of physics as this Knox-College philosopher, who cannot understand the nature of a magazine explosion nor grasp the cause of destruction attending it even after it has been pointed out to him. But we cannot do him full justice without first quoting his words. Here they are:

"2. If we experiment with the bowl of water as in II, we find that the velocity with which the falling drop strikes the surface makes not the least difference in the apparent velocity of the wave. Indeed, the end of the rod may be brought into contact with the surface of the water so slowly that the motion is imperceptible, and still the wave moves precisely as fast as when a smart blow is given the surface with the end of the rod. A comparatively slow motion in the tuning-fork, then, may cause rapid vibration in the air with which it comes in contact.

"3. Suppose a bat weighing four pounds to be swung with a velocity of fifty feet a second striking a ball that weighs one-fourth of a pound. The momentum given the ball must be two hundred, and hence its velocity is eight hundred. It follows that a body moving with moderate velocity may impart great velocity to another upon which it impinges."

After reading this singular exhibit of the most manifest want of scientific comprehension, our sympathies involuntarily go out to the young men who are fated to attend colleges where such amazing natural philosophy is taught for science. Is it possible that an average investigator of physical philosophy is incapable of seeing that there is not the slightest similarity in the two cases named by this professor, and that of atmospheric disturbance? If Prof. Comstock will abstract his mind from all other thoughts long enough to read attentively what we are about to state he may be wiser for so doing, whether he is willing to admit it or not. At all events his students, who have not so much prejudice to unload, will both see it and acknowledge it.

And first let us say that the contact of the end of the rod with the surface of the water, either gently or swiftly, does not send the waves off at all! We may use such expressions in a loose way as that a paddle-wheel of a steamboat sends off

large waves, etc. But, scientifically speaking, it does nothing of the kind; and it is strange that a physicist, when trying to analyze that very problem in physics, cannot see it. The end of the rod in his illustration simply displaces a quantity of water (the quantity being proportioned to the superficial area of the end of the rod and the depth to which it enters the water), and that is all the rod does in relation to the system of waves seen to pass away in all directions. Then gravity, an ever-ready and ever-acting mechanical force, steps in and does the rest of the work. It pulls down the ring of water which the rod has raised around it, and in pulling it down it presses up another ring of water directly outside of it, but not quite so high, and then in like manner pulls that down, pressing up another, and so on, as far as the waves extend, *such action necessarily being always uniform in proportion to the quantity and height of the ring of water acted upon by gravity.* Hence, the *velocity* of water-waves, caused as they are by this uniform action of gravity, must always be in exact proportion to the size and height of the waves thus kept in action, or to the quantity of water at first displaced and then pulled down by gravity. This simple solution of the true cause of wave-motion on liquid surfaces, plain as it is when stated, is entirely new to science, not being found in any published work till it appeared in the first volume of THE MICROCOSM. But we honestly fear, simple and self-evident as it is, that it is too much for Prof. Comstock, or he would have seen it before. We would be glad to simplify it had we the space to spare, so as to bring it within his grasp; but will have to let him think it out, if possible, and it will do him more good.

But the process is entirely different with the air. Our atmosphere is so tenuous and mobile, and at the same time so completely suspended in *equilibrio* that gravity has nothing whatever to do with continuing any motion the atmosphere may receive by a disturbing body. Only two factors can enter into the velocity of atmospheric motion from a disturbing body; one is the force of displacement given to it by the size and velocity of the disturbing body itself till it again comes to equilibrio; and the other is the elastic action or spring force the air exerts in consequence of the compression it receives from the motion of the disturbing body. It recoils from such compression and thus aids to shove itself away. If the displacement of the air should be at high velocity it not only moves away to a very limited distance at a correspondingly high rate of speed, but it is compressed in proportion to such velocity and its own weight and elasticity, and this compression acts upon the air in front, and also upon the displacing body, to give it (the air) additional velocity for a short distance only in the open air, where its mobility soon brings it into quiesence and equilibrio. But if the disturbing motion be slow, like that of a prong when sounding (which can, as we have shown, be not more than at the rate of *one inch* in a second), it is manifest to any mind capable of reasoning philosophically, that no appreciable or calculable compression can take place in such a tenuous and mobile substance, perfectly free to move out of the way, and, consequently, that no motion can be communicated to such displaced air or its so-called air-wave, swifter than that of the prong that may displace it. Why? Simply because there is no gravity or any other force to take up the effect of the prong, and no reactive effect in the elastic air, since no spring-force has been generated by compression, the motion of the prong being so slow that it was much easier for the air to slip to one side and get out of the way than to remain and be compressed. How plain and simple is all this! Hence, Prof. French, of Urbana University, was forced to admit that a tuning-fork's prong, even at 16 inches in a second, moved too sluggishly to compress the air and send off a sound-wave! He had not then learned that it could and does produce audible tone when not moving at the rate of *one inch* in a second at the swiftest part of its travel; *but he knows it now!* (See March MICROCOSM).

The very same principle of natural philosophy here evolved is beautifully confirmed by Prof. Comstock's illustration of the bat and ball. Let us now make this plain. The ball having considerable *inertia*, and being also elastic, does not get under the full velocity of the bat when first struck, or until a powerful spring-force is generated or accumulated by compression in the side of the ball next to the bat, as well as in the somewhat elastic surface of the bat itself next to the ball. This double accumulation of spring-force recoils into action and unites with the velocity of the bat in making the ball bound away much swifter, the instant they separate, than the bat traveled. But what was it that sent the ball away swifter than the motion of the bat? Not the bat's velocity, surely, for nothing can give what it does not possess. Hence, if the ball depended for its velocity entirely on the velocity of the bat, it could by no possibility travel any faster than the bat travelled; just as the water-waves could by no possibility travel faster than the motion of the disturbing body if they depended exclusively on such motion for their velocity. But the waves, as we have seen, do not depend upon the rate of motion of the body that starts the disturbance, but travel under a new and additional force. So it is with the ball. It can only go swifter than the bat by the aid of another force separate from the bat's velocity. What, then, is this law, or the true cause of the ball's greater velocity than that of the bat? It is simply the *inertia* of the ball and bat in coming together and which generate out of their two elasticities the powerful spring-force that comes into play and is instantly added to the bat's rate of velocity, thus causing the ball to shoot away at a much greater velocity than that of the bat itself. This simple explanation, new also to science and found in no text-book, we presume will also prove too much for Prof. Comstock's book-ideas, since he makes the whole matter depend upon the *comparative weight of the two bodies*, an idea too preposterous to be ridiculed. The Professor is manifestly not used to this analytical, original work in his routine plodding in the college library for things to copy and tell to his classes. But should this solution seem a little heavy at first, let him ask himself how much faster an actual *ball of air* of the same size would travel than would the bat if it were struck by it under the same velocity of fifty feet in a second! We doubt if it would travel any faster, or even a single foot farther than the bat would accompany it, for the want of that very *inertia* necessary to utilize its elasticity and thus generate spring-force. If Prof. Comstock cannot yet understand this, then let us tell him another secret in physics that he manifestly has never dreamt of, and which he can never find out from the text-books, because it is not there, and that is, if both his ball and bat were perfectly *inelastic*, whatever their *in-*

ertia, and whatever the *velocity* of the bat, the ball would not travel an iota faster after leaving the bat than the bat travels at and immediately after the time of striking the ball. And by the same principle of philosophy, if the ball were perfectly devoid of *inertia*, however elastic, it would receive no compression at all, and would therefore not travel a single inch away from the bat whatever the velocity of the blow. *Elasticity* can only be utilized or converted into spring force and motion by the resistance of *inertia* or its equivalent. Hence, the nearer no inertia a ball may have, as approximately illustrated in the case of a ball of free air, the less can its elasticity be utilized or converted into spring-force by a compressing blow, and the less will be its momentum or rate of travel by recoil after the contact of the blow ceases. If the air were confined in a tube, then, manifestly, the tube takes the place of *inertia* for causing compression, and allows the *elasticity* to be converted into spring-power, as, for example, by the blow of a piston.

But this, also, is no doubt too heavy for a professor who could get off such a maladroit argument for the wave-theory as these two illustrations of water-waves and the bat and ball. Not the slightest conception did he form of the action of gravity, the sole agent, in causing the velocity of water-waves, but supposed it to be all due to the slow motion of the end of the rod; and hence his crude idea of the limited recoil of waves when striking a wall as having any possible analogy to the reflection of sound or light. And not the slightest glimpse did he catch of the true cause of the difference in the velocity of the ball and the bat, namely, the conversion of elasticity into spring-force by the agency of *inertia*, but he actually attributed it all to the difference in size or weight of bat and ball, a matter but remotely connected with the problem. Let us now prove it, and expose, as it deserves, this shallow reasoning. As the four-pound bat, with a velocity of fifty feet in a second, gives a four-ounce ball, according to this illustration, a velocity of eight hundred feet in a second (the average speed of a rifle bullet), then plainly if the bat should be doubled in weight (8 pounds) and swung with the same velocity, it would make the four-ounce ball's velocity 1,600 feet in a second. But keeping the bat at eight pounds and fifty feet velocity, and reducing the ball to *one ounce*, thus keeping their comparative weight the only cause of the ball's superior speed, and its velocity would necessarily increase to 6,400 feet in a second, since this text-book "momentum" must hold good, if there is the least philosophical meaning in the illustration! And by the same system of logic our prodigious philosopher could continue to increase the weight of the bat and reduce that of the ball till finally he might, through this law of "momentum," attain the velocity of light, for ought we can see, while never suspecting the real reason why a ball travels faster than a bat. Base-ball players may thank their stars that their balls and bats do not behave on the principles of natural philosophy as taught in Knox College.

Query: Will Prof. Comstock now heed our advice, or will he attempt deeper water and still more serious dangers?

THE END OF THE SECOND YEAR.

This number closes the Second Year of THE MICROCOSM, and we look back with a good deal of gratification mingled with some regrets at the work we have been enabled to accomplish during that period. First, we thank God for the health and strength of body and mind that have sustained us in the work which has been more than ordinarily onorous and taxing to our powers; and second, we thank the hosts of friends of this magazine who have so generously aided us with the sinews of war, and so nobly stood by and cheered us with kind words as the various battles in philosophy and science have progressed in these columns. But for the encouraging words continually received from our readers, we confess that we would sometimes have felt like sinking under the weight of constant toil and care that has pressed us since the first editorial of this volume was written. We do not claim to say how well or how satisfactorily our work has been done during the journalistic year now closed, nor do we doubt but that many imperfections have blurred the pages of THE MICROCOSM from time to time, that have been glaringly conspicuous to the more cultured of our readers, but which we, in our crush and excitement of editorial life, have overlooked or been incompetent to detect. Without soliciting justification or even leniency for any such shortcomings, we feel sure, if it were really known to our subscribers with what persistent and painstaking care and labor these monthly visits have been made on time, that the most exacting critics among our readers would be willing to write in pencil on the margin of this leaf—"*Well done, under the circumstances.*" This much, in our inmost conscience, we feel that we have a right to ask at the hands of such patient and attentive readers; for we *know* positively that in the whole United States no other journal of the same size contains the same amount of original thought and discussion, every sentence, line, and word of which are either the production of one individual pen, or else have to pass under one individual scrutiny before daring to see the press. Yet this work, with all its exacting responsibility, is not more than the half of the mental strain necessarily resulting from the business care connected with this publication office which has no other head than our own (except nominally) to look after its general interests. We say these things to enable us to add, that we hope for efficient assistance for the coming volume who can take not only the business portion of the work off our hands, but who will aid us materially in lessening the work of editing our journal, giving us more time to mature and perfect those investigations and discussions of science and philosophy which seem to have made THE MICROCOSM their special and appropriate medium for reaching the public.

We regret more than all else the necessity which has been upon us, during the year that is past, for neglecting to recognize personally the many kindnesses our dear friends have shown toward us and our work. Though many have written us repeatedly without a personal response from the Editor, while hundreds have written twice or thrice, yet uniformly no complaints have reached us on account of the apparently shabby neglect we have shown in return. Most of these, at the second writing, have intuitively recognized the work on our hands, and have insisted that no reply was expected, and that they knew only two well how careworn and overtasked we must be in the endless discussions in which THE MICROCOSM is engaged. Thanks, unnumbered thanks, for such thoughtful friends. To all such in the future we must say that though we may neglect to answer

their kind words, we none the less cherish and appreciate these cheerful aids that have so often encouraged us in the weary months of toil during the past year.

Another year now begins its round of duties and responsibilities for which we have again buckled on our armor. We know of a certainty that many of our subscribers feel stronger in the hope of a real hereafter, beyond the cares of the present life, from reading THE MICROCOSM than they ever felt before this journal fell into their hands; for hundreds have so written to us. This one fact and assurance of its truth more than pays us for the year's incessant labor. With the profound hope that in each additional volume we shall be spared to edit, this evidence of the good work it is doing shall increase till thousands shall bless THE MICROCOSM, we bid our old subscribers a kind adieu.

VALUE OF THE SOUND-DISCUSSION.

Still a few of our subscribers, who have failed to grasp the broad import of our journalistic enterprise, ask us the object of so much upon the "sound" question. In the preface to the *Problem of Human Life* we tried to give in a brief paragraph a good and sufficient reason for this philosophical investigation, and showed it to be the very keystone of the arch of our attack upon materialism. In a sentence or two let us repeat it. If the wave-theory of sound—the representative "mode of motion" of physical science—shall fairly break down under our attack, then it follows irresistibly that *sound* can be nothing else than an imponderable, incorporeal *substance*, beyond or outside of the realm of material entities; and if sound is an immaterial substance, then light, heat, gravitation, etc., as modes of molecular vibration, must also give way, and must be conceded to be real, though immaterial, substances; and if all the forces of Nature are thus really substantial, though necessarily immaterial, then the materialistic claim, that the soul, life, mind and spirit are but modes of motion of the brain-molecules, is swept out of existence. For plainly, if magnetism, electricity, sound, light, heat, mind, soul, spirit, etc., are thus shown to be substantial existences, though not chained to material conditions, but freely permeating and passing through all material bodies as if they were not present, then manifestly the very foundation of materialistic science crumbles beneath the weight of such scientific truth, and its place is taken by the broad principle of *substantialism* as a rational and satisfactory basis for man's future immortality.

But let Christian theists once concede to scientists that sound, light, heat, gravity, magnetism, electricity, etc., are but modes of molecular vibration and not real entities, as they have hitherto inconsiderately done, and at once the shrewd atheist, as does Prof. Haeckel, will laugh at them and ask: If all these natural phenomena or manifestations of energy are but modes of motion, then what reason is there for believing that the energy manifested by life, soul, mind or spirit is anything more than a similar motion of the brain-particles, just as sound is but the motion of air-particles? And as this motion of the air, which is all there is of sound, necessarily ceases to exist as soon as the air-particles come to rest, so the motion of the brain-molecules (which constitute the soul, life and mind) ceases to exist whenever the man dies and his brain-molecules cease to move! Hence the idea of the future existence of the soul, or spirit, or mind, or life (as a mere mode of motion), is justly and necessarily discarded by the scientific materialist as a puerile conception and a self-evident fallacy. And we assert here that this masterly argument of the materialist, as so forcibly put by Prof. Haeckel, was never met or even attempted to be met logically till it was assailed by the substantial philosophy as first roughly outlined in the *Problem of Human Life*. This is not given in a boastful spirit at all, but as an indisputable historical fact which the theological world is fast coming to recognize. Mind, soul, life and spirit, in the hands of such men as Haeckel and Huxley, were defiantly brandished in the face of the clergy as but the molecular motion of the brain-particles, and it tied them helpless at the feet of materialism so long as *sound* was universally recognized as but the motion of material air-particles, and light but the wave-motion of gelatinous ether. Hence, the incomparable value of this radical onslaught.

It follows, therefore, whether clergymen will see it or not, that the only successful way to meet and overwhelm materialism and take from it these powerful philosophical arguments against the substantial existence of the soul after the body dies, is to break up and pulverize its foundation in physical science by showing that every force or so-called mode of motion in Nature is a real incorporeal entity or immaterial substance. Our very first discovery was to see that the clergy were hopelessly involved by their thoughtless concessions to physical science as taught in all the colleges, which virtually made the mind and soul but modes of molecular vibration just as materialism claims. As proof of this we show in the "*Problem*," at page 71, that the eminent Joseph Cook in his very strongest effort to vindicate the immortality of the soul, actually gives it away to Huxley and Haeckel by comparing the soul to *sound* and *light* as two mere modes of motion of other and separate substances! Hence we there explained, reluctant as we were to do it, how Huxley could tie the great Boston lecturer hand and foot with his own cords. So can any clergyman in America be tied by the weakest disciple of Haeckel, unless he abandon the wave-theory and fall into the ranks of *substantialism* as the only hope of safety.

When we began first to write the "*Problem*," we saw the necessity of beginning the revolution with *sound*, since it was confessedly the most plausible and apparently self-evident of all the so-called modes of motion claimed by physicists, having never been doubted or called in question as the mere motion of air-waves. Hence we saw, if *sound*, as the motion of air-particles, should break down, and be resolved by closer scrutiny into substantial *pulses*, as so many other nebulosities, by aid of the telescope, have been resolved into actual suns, then all the other forces of Nature or so-called modes of motion would necessarily and scientifically follow—including, light, heat, gravitation, electricity, life, soul, mind and spirit, and that materialism would thereby be stripped of its raiment and pilloried naked before the gaze of the religious world. Yet, with all this plain and conclusive reasoning, Christian ministers and editors fail to see the importance of the new tactics, or to realize the certainty of success that must attend the campaign thus conducted upon the open plain of *substantialism*. On the contrary, many of them, apparently blinded by prejudice at

the novelty of the programme, throw obstacles in the way of our generals, and even mutinously furnish weapons and ammunition to the enemy.

We are glad, however, to know that such ministers and editors are becoming fewer as the wave-theory is more thoroughly examined into and our arguments against it are more critically and fairly analyzed. We confidently look forward to the near future when every intelligent religionist in the land will come to view the matter consistently, and to see with Kephart, Swander, Carter, Balsbaugh, Bates, Hamlin, Munnell, and scores of others who have writen to us upon the subject, that the overthrow of the wave-theory, and the proof thereby that sound is a substantial entity, are the trumpet-blasts for the final charge of Israel's hosts upon the very Jericho of materialism, and which, by the united help of Christian ministers, will prove also the death-knell of infidel science throughout the world.

ANOTHER THREATENED REVIEW.

For some months past we have been receiving intimations from various sources, as also hinted in Dr. Swander's paper on "Kind Words," in this number of THE MICROCOSM, that there is to be a terrific and crushing review of the "Problem of Human Life," particularly on the sound question, in the forthcoming July number of the *Reformed Quarterly Review*. It is to be, as supposed, from the pen of one Prof. Stahr.

Of course that *Quarterly* will not appear till after this number of our magazine has gone to press, and we shall, therefore, not be able to pay our respects to that doughty champion of the wave-theory, until in the August issue of THE MICROCOSM, when we expect to let our light shine and our readers know how much, approximately, there is left of us if anything. We will only intimate here that similar portentous clouds hung loweringly over the Western horizon for two or three months before Prof. French's "crushing" review made its appearance in the *New Church Quarterly*. That review finally came and our replies followed in this magazine, with what result we need not tell the reader. So also will it be with Prof. *Stahr* in all human probability, though we learn that he is a Sta(h)r of the first magnitude. One thing, however, we can safely predict, that neither Prof. Stahr nor any other man dares at this date to go into a deliberate defense of the wave-theory of sound. Mark well this prediction. To attempt such a foolhardy exploit in the light of recent exposures and controversies, would be to court speedy annihilation, and a few of the ablest professors in this country already know it. We therefore confidently expect, in lieu of such a frank, courageous, and manly defense of the old theory, an attack upon our arguments and calculations, some of which, as we are well aware, contain defects both in style, matter, and inadvertent expressions, which are now in process of correction. But for these few inadvertencies (in this first and only work on this side of the question), it would be difficult to guess what the great professors would do who venture occasionally from behind their college chairs to attack this book. But in every instance, so far, they pounce with all the apparent courage of a lion upon a few such simple defects and boastfully proclaim the author an ignoramus and his book overthrown, but studiously avoid any reference to the score of unanswerable arguments against the wave-theory, or the dozens of instances in which the ablest physicists have, while legitimately defending the theory, impaled themselves upon the abatis of our entrenchments by their ludicrous self-contradictions and preposterous statements of experiments, which when performed, flatly contradict them. Witness the tin-tube experiment; the tuning-fork's prong, "*swiftly* advancing" at the velocity of *one inch only* in a second; the tearing of buildings, men, and animals to pieces by a sound-pulse; the stupendous fiasco with the *double siren*, etc. We have already given professors of physics due notice in this journal that it is the old-established theory of sound that is on trial for its life, and not our first crude presentation of the reasons for abandoning it, which are now being vastly reinforced. We here repeat the notice, and will add that we can throw away and take back, if necessary, one-half of all we have written in the "Problem" on the current theory of sound, and still drive into utter confusion its ablest advocates with the other half,—yes, with a tenth part of what that book contains. Will ambitious reviewers among college professors please make a note of this, and remember that the *Evolution of Sound*, properly revised, has come to stay; and that no dozen defects in its present language or style, if they could be pointed out, will prove the slightest antidote for the doomed theory they are pertinaciously teaching to their classes.

MISSIONARIES OF SUBSTANTIALISM.

We have had several applications from young men who write to obtain advice about the propriety of their taking the field as missionaries in spreading the principles of the new substantial philosophy, in which work they propose principally to travel and deliver public lectures, and incidentally to sell books, take subscriptions, &c. Some of these have requested us to aid them in preparing suitable lectures to deliver,—such as will present and defend the salient features of the new doctrine. To all such would-be workers in a good cause we would say, that an abundance of materials for a course of lectures upon substantialism and collateral subjects can be found ready at hand in the two volumes of the MICROCOSM and in the "Problem of Human Life." Lecturers are at liberty to appropriate those arguments and use them for the purposes indicated, making them their own in language as much as may be, without giving credit, so they only thereby spread the glad tidings that there is a real heaven, a personal God, a substantial hereafter to humanity, and that man has as really a substantial soul as he has a material body. We believe that such lectures will do good, and that a resolute young man with intelligence and address to aid him, can command attentive listeners and plenty of them in almost any section of the country.

THE NASHVILLE CHRISTIAN ADVOCATE.

Last month, after writing our reply to Prof. Lupton's card, as printed in the June MICROCOSM, page 348, we wrote to Dr. Fitzgerald, the editor of the *Advocate*, a polite note, inclosing stamp for answer, asking if he would print our short reply. *Not a syllable have we received in return.* We make this exhibit of editorial courtesy for the benefit of our hundreds of subscribers who read the *Advocate*. Query: Was Dr. Fitzgerald afraid to publish our answer, or even to reply to our letter, lest Prof. Lupton should think him "absurd"? (See Dr. Riggin's defense of Lupton, page 369.)

MORE WINDOWS BROKEN BY SOUND.

The following telegram, as shown by date, was received and printed in the New York papers:

POWDER MAGAZINE STRUCK BY LIGHTNING.

HUTCHINSON, KANSAS, June 7.—The Hazard Powder Company's magazine, containing 1,300 pounds of powder, was struck by lightning yesterday morning, causing an explosion which broke nearly every glass front in the city, wrenched several buildings from their foundations, and knocked down plastering, lamps, and clocks a mile away. One dwelling 300 yards away was riddled by flying bricks.

Of course, according to Prof. Tyndall, Prof. Lupton, Prof. Comstock, Prof. French, and all the greater and lesser lights of physical science now teaching the wave-theory in the different colleges and universities of the world, it was the *sound* of this explosion, and only the *sound*, which played such terrific destruction with the windows as reported above. What superlative nonsense! Suppose instead of the explosion of the powder the thunderpeal had occurred alone, and suppose it had been ten, twenty, or fifty times louder than the sound of the explosion, would a single window or pane of glass have been broken? No—a hundred times *no!* Had not the wave-theory of sound blinded the minds of all those who have taught it, there is not a professor of physics in America so stupid as not to see, at the first suggestion of the idea, that it was the instantaneously generated volume of gas and nothing else that hurled away the condensed air-wave that shattered the windows, wrenched buildings from their foundations, &c., and that the sound (another matter entirely) had nothing whatever to do with it. It is a burning disgrace to the intellectual culture of this nation that such a simple and self-evident matter in physical science has to be repeatedly urged and insisted upon, and even then cannot be grasped by eminent physicists in our great institutions of learning! Intelligent farmers, who send their sons to college, and who have readily caught this simple and common-sense idea, ought to send with them a written protest against their being taught any such mediæval nonsense for science as the wave-theory of sound, including this most prodigious of all frauds upon human intelligence about the effects of magazine explosions.

STILL THEY COME.

"It never rains but it pours." Nearly a dozen separate attacks, in the shape of long articles, of from two to ten newspaper columns each, have appeared within the last few weeks from the pens of as many professors of physical science in different colleges, who are ambitious to immortalize themselves by demolishing our work against the current theory of sound. (As one, see reply to Prof. Comstock elsewhere). We cannot notice or reply to all, or even to a quarter of them, though the strongest would be but the play-spell of an idle hour, if we should chance to have such a luxury. What is almost laughable about these attacks is, they all, with one accord, take up and reiterate arguments and criticisms that have been completely answered and exploded in the MICROCOSM, and the poor innocents who thus rehash them keep fireing away as if they were hitting the bull's eye every time and doing something remarkably creditable, when if they would only read this magazine they would know, alas! that they were only expending their amunition upon exploded criticisms, and thus amusing our readers with evidences of their weakness. A specimen of these trashy attempts of about five columns, and one of the most vituperative, boastful, and insolent that has yet appeared, occurs in a recent number of the Chicago *Christian Advocate* from the pen of one Prof. H. S. Carhart. We propose to settle that assault (out of respect to the readers of the prominent journal printing it) next month; so its author will heartily wish that his ambition for notoriety had never lured him into such a trap. If these rapidly multiplying assailants could only know how much good they were doing in keeping the *Problem of Human Life* prominently before the public, their manifest spitefulness would induce them to suppress their ambition and reluctantly withhold the benefit of such vast advertising facilities as they are furnishing us free of cost. If readers generally did not *think*, then these virulent attacks might do harm. As it is, we court them, and the more of them the better. So open your batteries, gentlemen, all along the line.

Since the above was in type we have received a letter from the Rev. Dr. Edwards, Editor of *The Advocate*, cheerfully offering to print our reply to Prof. Carhart. Many thanks.

OUR CONTRIBUTORS AGAIN.

We will not make invidious comparisons by naming individual contributions in this closing number of the volume to the omission of others. But we frankly declare that sixteen abler or more interesting articles upon various themes never appeared together, as we believe, in any other publication. We request every reader of this magazine to begin with the first paper of the series,—that of Eld. Towne,—and read consecutively through, including our familiar and reliable—Hamlin, Swander, Kephart, Lowber, Roberts, Carter, Hoffer, Nield, Van Dyke, Kavanaugh, &c., and see if our estimate shall not be indorsed in every particular. We have not only read these contibutions all through carefully, but we have studied each of them as we would study a schoolbook; and, with few exceptions, we were inclined to decide, with Esquire Dusenberry, that the last one read was the best, and to award it the prize! The truth is, they all deserve prizes; and had we but a small fraction of the wealth of a Gould or a Vanderbilt, we would present each of our contributors with a well-selected library of a thousand volumes, as a token of our profound esteem. Why could we not have been rich? What good we would have been able to do! Or why cannot some rich man who wishes to do good for all time, give a hundred thousand copies of Vol. 3 of the MICROCOSM to the poor at actual cost of paper, presswork, and binding, as the type has to be set any how? Such a donation would be an everlasting credit to the giver compared to leaving money to be quarreled over, as is quite frequently the case, by ungrateful and forgetful relatives. By such a gift, to the world, a man would build himself a monument higher than any mountain, and more enduring than granite or marble.

THE SOUTHWESTERN METHODIST.

We have written a reply to the recent illiterate series of articles by the Editor of the above-named journal against the "Problem of Human Life," but it is unavoidably crowded over to the next number. Those articles were begun over the name of "Emory," but in the last one the editor signs his full name—John Emory Godbey,—a thing he will be sick enough of when he reads our reply. He had better have kept it a secret.

In the meantime, let him study our tuning-fork criticism last month, if he has science enough to grasp it. We here thank the Methodist ministers who have so kindly kept us posted by sending us copies of that paper.

A KIND WORD FROM A DISTANCE.

Prof. Spangler, Director of the American College at Concepcion, Chili, S. A., and a careful investigator of physical science, who owns the "Problem," and is a subscriber for THE MICROCOSM, writes us as follows:

"I consider the "Problem" and MICROCOSM together as the wonder of the nineteenth century. It is a profound mystery to me how men like professors Strong and French can be so prejudiced against the plainest common sense as openly and bitterly to oppose your work. I thank Heaven a thousand times that you have proved the "man-of-war two miles out at sea," with those professors the two boys firing at it from the shore with their harmless shotguns! Your grape and canister served them right. Fraternally yours,

J. M. SPANGLER,
Director Am. College, Concepcion, Chili.

THE PROBLEM OF HUMAN LIFE.

More than 6,000 of our present subscribers for THE MICROCOSM do not own the above-named book. Each person interested in this magazine ought to have a copy of that book also in his library. It is one of the cheapest $2 books published, containing one-and-a-half times the amount of reading matter of this entire volume of THE MICROCOSM. Any subscriber desiring the work, can remit $1 (half-price), when sending his renewal for Vol. 3 of THE MICROCOSM ($2 in all), and the "Problem" will be sent post paid. We will also say that those subscribers who do not yet own "*Walks and Words of Jesus*," ($1) or "*Universalism Against Itself*," ($1) can remit 75 cents, and either book will be sent postpaid. These offers are only to subscribers for THE MICROCOSM.

HALL & CO.,
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JUDGE O. S. POSTON AGAIN.

We have received a carefully written reply from Judge Poston to our argument in the May MICROCOSM which we gave in answer to his able article in the April number. The Judge produces the three invincible proof-texts from Scripture in support of *Universal Salvation*, for which we asked, and of course it is supposed that he selected the three that he considered as forming the most conclusive Scripture argument in favor of his doctrine. These texts we shall answer and explain next month, giving the Judge's paper complete, since the matter for this number was made up before his article was received. The reader may look for an interesting discussion.

REPRINT OF VOLUME I.

The electrotyping of the first volume of THE MICROCOSM, uniform with this, is now well under way and will be completed in August, when the volume will be immediately issued, bound in cloth, at $1 to subscribers; $1.25 to all others. As soon as issued all orders on hand will be filled. No reduction to agents for Volume I. For both volumes (1 and 2), bound together, see 3d page of cover.

CONTRIBUTIONS FOR AUGUST.

The Third Volume of the MICROCOSM will open up next month with the following, among other contributions; Dr. Roberts,—Laws of Mind, No. 4; Dr. Swander,—The Mercersburg Philosophy; Prof. Kephart,—Freedom of the Will, No. 3; Thomas Munnell,—The Best Argument for the Immortality of Man; Prof. Hand,—Physical and Spiritual Gymnasia; Judge Poston,—Universal Salvation, with Editor's Reply; Prof. Lowber,—Modern Philosophy and Christianity, No. 3; Isaac Hoffer,—Characteristics of the Forces of Nature, No 2; Capt. Carter,—Spiritualism, No. 3; Prof. Slingerland,—Science and the Deluge; Prof. Wood,—The Motions of the Planets; Prof. Vail,—The Earth's Annular System; Dr. Van Dyke,—Evolution, No. 3; Dr. Kavanaugh,—Electricity, &c., with Editor's Reply; Dr. Smith,—Does Geology Ignore a Creator? Eld. Towne,—Secondary Correlation of Forces; Dr. Cronin, on Homeopathy, &c., &c.

Among the editorials will be—A Hygienic Discovery and a Personal Reminiscence, reaching back for thirty-four years; The Ram's Horns at Jericho, a New Theory; and numerous scientific discussions as usual.

SUBSTANTIALISM ASSAILED.

Prof. Cather, editor of *The Weather Indicator*, makes a vigorous attack upon substantialism in his June number, and with some ideas that are new, and some that are as absurd as they are novel. We cannot intelligibly reply to his articles till he has completed his series, which he intimates will require several monthly papers. When he has finished his review we will attend to the matter, and answer him as we think it requires. His positions, so far, we will only say here, are completely self-nugatory; and as developed in his June article, they are fundamentally incongruous. We will only here quote his words on *sound*, and leave the reader to reflect till our final reply.

"Sound results, or is conveyed by vibratory infinitesimals, notwithstanding the wave-theory may be exploded. *But these infinitesimals, substantial as they are, are material as we observe.*"

He is thus right in one thing, but ridiculously wrong in another; as, for example, sound-"infinitesimals" being "material" *substance!* But wait, and we will see what we shall see.

CLUB TERMS, ETC.

Any reader who will send us the names of three *new* subscribers for volume 3, with the money ($3), will receive that volume gratis. Old subscribers can renew their subscriptions for volume 3, by simply inclosing $1. Agents who will canvass for *new* subscribers can send us 75 cents each, retaining 25 cents each for their trouble. This magazine, so far, has cost every penny we have received for it; and we believe that no such amount of original reading matter is furnished for the same price in any other journal now published. It is only by a very large subscription list that it can pay expenses at $1, and we are very thankful we have such a list. If we do not keep it, and double it before another volume is ended, it will not be our fault. Old subscribers, therefore, who propose to continue to take the next volume will greatly aid us by renewing as soon as possible after receiving this number, that we may be able to judge approximately as to the size of the edition to start with.

Address, HALL & CO., 23 Park Row, New York.

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